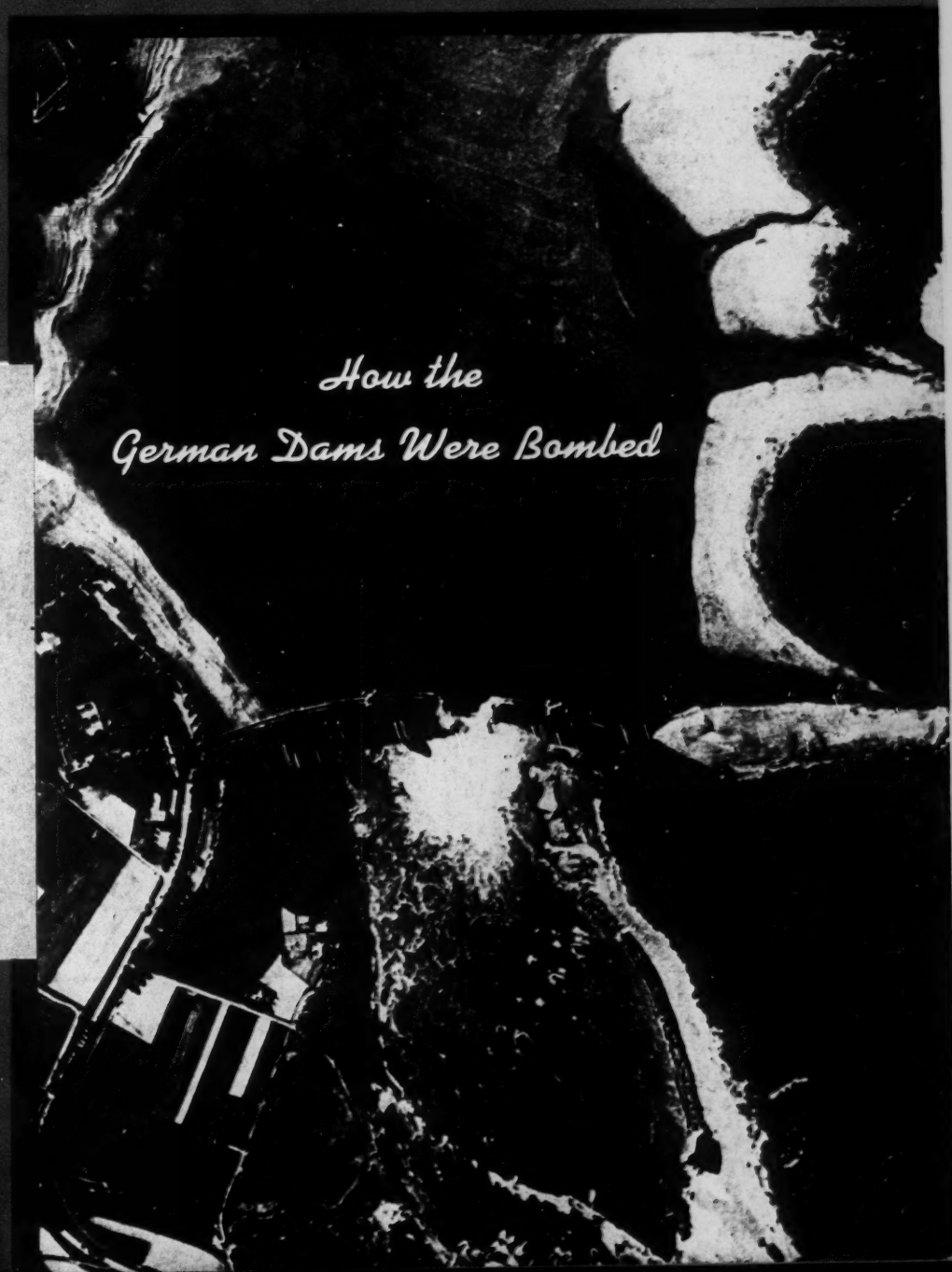
ENGINEERING NEWS-RECORD

JUNE 17
1943



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Built as a Federal Project by the Missouri State Highway Department, from plans prepared by the Frisco Railroad Company, this bridge was designed for minimum interruption to traffic for *installation—and for maintenance*. A ballast-deck type, it was completely prefabricated and assembled, needing only to be moved into position by a locomotive crane. The "time table" called for the ballast to be distributed, the ties placed, rails attached, and traffic once more rolling inside of an hour or two.

This type of bridge has been widely used in recent years, because of its many advantages. One basic requirement is a deck material highly resistive to corrosion. Brine drippings from refrigerator cars, sulfur acids leached from coal gondolas, and the run-off water which must be handled after every rain, are all hazards to deck life. Byers Wrought Iron provides the service qualities needed to resist such corrosion. Its combination of pure base metal and glass-like slag fibres both *resist* and *diffuse* corrosive attack. This discourages the accelerated localized pitting that causes ordinary materials to fail too soon.

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No engineer has to be told that it is much better and cheaper to *build* bridges right, rather than to keep them in shape by continuous maintenance. Our Technical Bulletin (recently revised), "Wrought Iron in Bridge Construction," gives a lot of helpful data on how and where wrought iron is extended the useful life of bridge structures. May we send you a copy?

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Vol. 130 JUNE 17, 1943 No. 24

COMING NEXT

• Before this nation entered the war large construction operations abroad, for both the army and navy, were executed by civilian contractors specializing in such work. But with the outbreak of war it was apparent that such a system could not be continued. How army engineer regiments, staffed and equipped to undertake any kind of construction, behind an army in the field, are being trained to work, to fight, to make victory possible will be told in ENR. July 1, issue.

• Straightening and bending of steel plate or structural shapes with an oxyacetylene flame is a procedure widely used but actually little understood. Maximum obtainable efficiency is seldom obtained. In *ENR* for July 1, La Motte Grover, well known structural welding engineer, will explain how operating efficiency can be improved, describe the equipment needed and tools available.

• Air-inlet valves installed on thin-walled, gravity-flow pipelines provide insurance against collapse that might result from the formation of a vacuum. Manner of calculating collapsing pressure, determination of pipe size, number and location of valves, with computations simplified with the aid of nomographs will be outlined in the July 1, issue.

LOOKING AHEAD

• Departing from the conventional drydock designed to resist uplift by sheer weight or by withdrawal resistance of piles, a series of basins for concrete ship construction and graving dock facilities have been completed with thin concrete floors and walls. Wellpoints are employed to keep the structure from floating when unwatered. This and other unusual features, will be described in an early issue.

• Water falling from above, coming in from the river, and up from the foundation developed unusual difficulties at Douglas Dam—but did not stop the fastest major dam construction schedule ever undertaken. Closed a few days before expiration of its 13 month schedule, this project added 100,000 kw. of power to the TVA system.

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Due to the paper shortage, no index for the current volume (Jan.-June, 1943) will be issued except to subscribers who ask for it. If you want a copy of the index please send in the coupon below.

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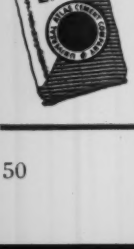

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The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JUNE 17, 1943 • VOLUME 130 • NUMBER 24

Blighted area rehabilitation covered by bill in Congress

Senator Wagner introduces legislation to provide one billion dollars a year for loans to cities for land purchases to clear large slum areas for redevelopment

Senator Robert F. Wagner of New York, at the request of the Urban Land Institute, has just introduced into the Senate a neighborhood development bill calling for an appropriation of $1,000,000,000 during the first year for loans to cities to purchase land to be redeveloped.

Regarding his proposal, Senator Wagner says: "This is primarily a private enterprise bill. It is not a public works bill, not a relief bill, and not primarily a bill for public spending. It might be called rather an encouragement-to-enterprise bill."

Charles T. Stewart, director of the Urban Land Institute, said that under the 10 year program the plan might result in the expenditure of $50,000,000,000 to rebuild outmoded communities after the war. The measure should draw about five dollars in private money for every dollar of federal credit to be extended, he estimates. In the course of a ten year program federal loans under this proposal would amount to about $10,000,000,000, but this money would be returned to the government with interest by the cities borrowing it.

Such cities would prepare comprehensive plans for redevelopment of their slum districts. Long-term federal credit then would be extended to the cities for purchase of the land in large tracts, perhaps as much as a square mile at a time, and to clear off existing outmoded structures.

The cities then would sell or lease the sites to private builders who would develop new neighborhoods under the general, unified plan for the area. Proceeds from the sales and rental of the land would be used to pay back the federal loans.

Although the initial phases of the plan could be put into operation at once, the major part of the new building work probably would have to be delayed until the war ends, but then it could constitute one of the leading factors in a return to civilian economy.

The Institute believes that enactment of the measure would enable wholesale clearance and replanning of undesirable sectors of each city, with a fresh start on new street systems, and permit a unified instead of a haphazard reconstruction job. With the benefit of recent experience, cities thus might guard against recurrence of blight.

The immediate purpose of the bill is to assist cities and towns in acquiring land in deteriorated urban areas to be sold and leased for the building of dwellings and for other construction being planned for the postwar period, so that construction and land improvement may be coordinated and made ready for execution in the postwar period.

It is stipulated that the provisions of the bill may not be construed to permit speculation in land holding. When land is acquired by a city and sold or leased to private interests the contract terms would obligate the purchasers or lessees to begin the building of their improvements within a reasonable period of time.

Under the terms of the bill the administrator of the National Housing Agency would be authorized to handle loans to cities or other appropriate local agencies. Loans would be paid back to the federal government over a period of time not exceeding 99 years.

War construction shifts overseas

Tapering off of military construction at home, combined with greatly increased deliveries of engineering and construction equipment to the Corps of Engineers, points toward a rapid increase in Army construction operations in foreign theaters of operation. Outstanding examples are deliveries of bridge parts and bridging equipment, including pontoon boats, for which deliveries in April of this year were 29 times greater than during the same period a year ago.

Less spectacular increases for the same period include three and one-half times as many steel mats for airfield construction, over five times as many searchlights, 15 times as many other types of lighting equipment, and nearly twice as much camouflage material.

Deliveries of construction equipment nearly doubled, while delivery of all types of engineering equipment was nearly tripled, with the April, 1943, figure reaching $62,468,000. May figures are expected to total over $70,000,000.

With the supply of surplus and used construction equipment nearly exhausted, practically all deliveries at present are coming from manufacturers production lines and from basic stock of raw materials. Equipment being purchased has been standardized on the basis of engineering tests. Manufacturers who are turning out new pieces of equipment have been invited to bring such items to the attention of the procurement officer in the nearest division office of the Corps of Engineers. Procurement of engineering equipment has been decentralized, major responsibility for such purchases being placed in the division offices.

Concerning the shift of scene in military construction, Maj. Gen. Eugene Reybold, Chief of Engineers, recently pointed out that as one phase of construction declines rapidly in volume, another phase becomes increasingly important. The scene, he said, is shifting from preparation here at home to actual theaters of war abroad. "It is a tremendous task," he said, "but we must supply facilities for the supply lines. The change is not so much in pace as in emphasis, with most of the construction responsibility transferred to foreign shores. The work must be done by troop units, with skilled workers and officers from the construction industry."

War housing construction to operate under controlled-materials plan

To obtain such materials for housing work contractors must apply to the National Housing Agency under a CMP allotment

On July 1, the War Production Board will put into effect the controlled materials plan for allocation of materials for war housing. This will supersede in part the preference rating-order system, and is expected to provide a more desirable type of working arrangement for contractors, so far as material requisitioning is concerned.

In order to receive controlled materials for housing construction not completed by July 1, contractors must apply for such materials under a CMP allotment. Controlled materials for war housing include concrete reinforcing bars, steel pipe, steel wire and wire products such as nails, and copper wire and cable.

The National Housing Agency, through which contractors must apply for controlled materials for war housing, is but one of several claimant agencies, such as the Navy, Army and Maritime Commission, among which controlled materials are divided after a calculation is made as to what is available, prior to the beginning of each quarter of the year. Each claimant agency must submit to the War Production Board the amount of materials needed for the coming quarter, whereupon WPB reconciles requests with available materials. Thus, the contractor will be assured of complete information concerning whether or not he will be able to get what he wants.

As to the rest of the preference-rated material the builder may require—such as lumber and metal products—execution of Form CMP-H-1 by the FHA office secures for him his CMP allotment, authorizes the construction schedule and also includes an assignment of an AA-3 preference rating for lumber and the like. The form is to be filed with the local field office of the National Housing Agency's federal housing administration. Copies can be obtained from either WPB district offices or FHA field offices.

This procedure is to be followed for both publicly and privately financed war housing, except that in the case of public financing, contracts must be with the field office of the Federal Public Housing Authority having jurisdiction over the project.

For private financing, there are several more forms for builders to fill out, and these can be approved only in areas where a local NHA quota for privately financed war housing is available. Both forms are for local FHA field office files, PD-105 being an application form, and PD-105A a list of the materials needed for the proposed project.

If there is no hitch anywhere along the line, FHA recommends approval to WPB which, upon concurring, issues a P-55-b order, which carries authority to proceed with construction.

The new plan, which has been evolving since the difficult priority days of last summer and fall, is of immediate interest to the builders of 61,102 family units (privately financed) for which, on April 30, contractors held priority orders and on which they planned to start work. As has already been stated, no more controlled materials for these unfinished projects can be acquired after July 1 without going through the channels designated by the new plan.

The plan definitely ta[kes] housing of the hit-or-miss mat[erials] situat[ion] under which it has been [operating]. it comes in time to speed [construction] 250,000 units of new cons[truction] deem[ed] necessary to house incomi[ng] war work[ers] during the coming year be[ginning] July

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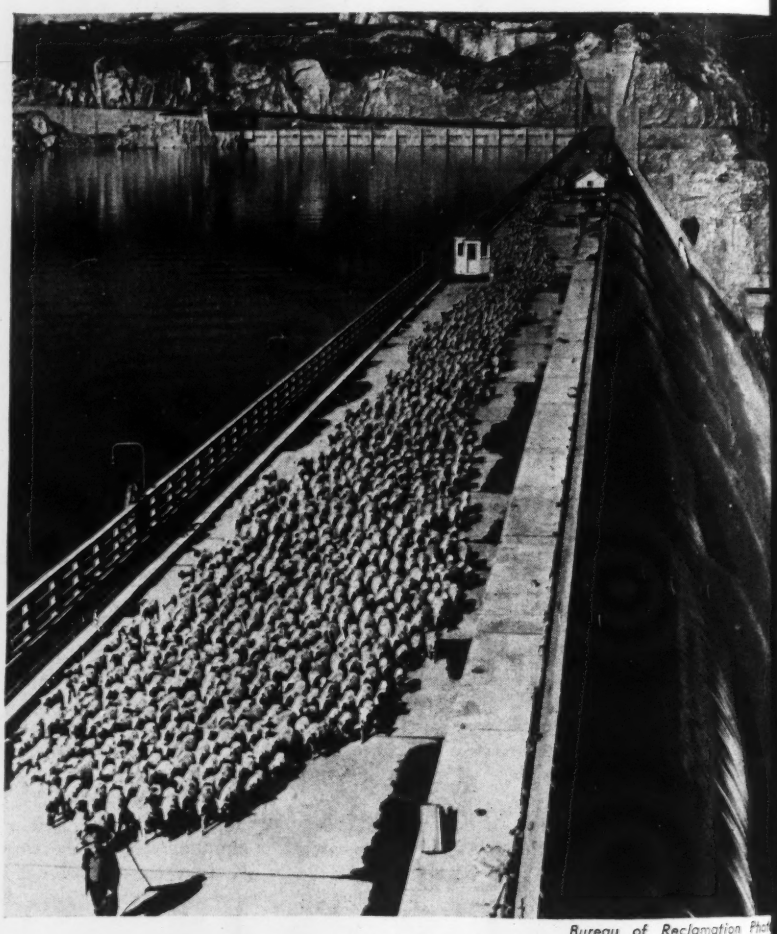
Postwar highway fund created in Wisconsin

Financing of postwar construction state trunk highways and retirement ccunty highway bonds is provided in a $17,500,000 trust fund created cently by the Wisconsin legislature. T new legislation provides for transfer the trust fund from the state treasur present $30,000,000 surplus cash balan now invested in United States war bon The legislative bill was strongly back by the Wisconsin County Boards As ciation.



Bureau of Reclamation Phot

The Coulee Dam serves a peaceful purpose

While the roadway atop the Coulee Dam is not open to vehicular traffic during the war, these sheep were allowed to pass as not being under suspicion as possible saboteurs. Th[is] combination pastoral-industrial scene migh[t] well be captioned "Peace and Power."

WASHINGTON HIGHLIGHTS

Of the $106,000,000 military program r 1943, which includes pay, subsistence d other non-munitions expenses, around n per cent is earmarked for construc- on. Though the total is 80 percent ore than for 1942, the $11,000,000,000 r construction is only 13 percent of is year's total, while in 1942 con- ruction was 30 per cent. The drop is e to the near-completion of bases, bar- cks, hospitals, etc., for training and intenance of the armed forces.

With only a few facilities remaining be built for ardnance, machinery, and achine tool plants, it is expected that the end of 1943 construction will be wn almost to the 1941 level. Only out $500,000,000 worth of projects w planned is not expected to be ished by 1944. Delays are expected, rtly because of the inability of the chinery industries to produce certain itical types of machinery and equip- nt as rapidly as plants are completed; t more particularly delays are due to rtages in material and labor, and to rtcomings in scheduling and organ- tion of production.

Due to the relatively late start of the ogram, facilities for producing raw terials, particularly certain basic tals and chemicals are less abundant an those for fabrication.

The House has passed and sent to e Senate a bill which assures to states eir share of the 1941-appropriated fed- al-aid funds for highways and the imination of grade crossings, even ough unavailability of materials and bor postpones the use of the money. he bill provides that these funds "shall main available for obligation by the ates during continuance of the emer- ncy declared by the President on May 1941, and for a period of one year reafter."

By the same bill, the Commissioner Public Roads is directed to make sur- y, and to report within six months to e President and to Congress, on a sys- m of express highways throughout e United States, reporting the number eded, the approximate routes, and the st of construction.

Another provision is that states be rmitted to use their share of a $50,- 00,000 federal-aid fund for engineer- g investigations and surveys for post- ar construction.

Following a practice used success- lly by the Public Roads Administration, the Public Works Department of New Zealand is planning to use microfilms to solve its map storage problems. Federal-aid road maps in the PRA office, which are 22 x 36 in. in size, are microfilmed at a cost of five cents per sheet. The saving in time in finding maps under the microfilm system is very great.

• • •

Chief Engineer Frame of Pa. highways, resigns

Thomas C. Frame, for four years chief engineer of the Pennsylvania state highway department, announced June 2 that he had resigned from his post.

Frame, who began his long career with the department under Governor John K. Tener, said he was leaving for personal reasons, pointing out that war conditions have reduced the volume of highway department activities. At Harrisburg, Secretary John U. Shroyer of the department said, "I am sorry to see Mr. Frame go. He was a good man."

Mr. Shroyer said he had no plans to fill the $10,000 job in the near future because of lack of work in the highways department resulting from wartime suspension of roadbuilding.

• • •

Western highway officers meet at San Francisco

The Western Association of State Highway Officials with representative men present from twelve Western states, including Texas, held its annual meeting in San Francisco June 4 and 5, immediately following two other meetings of widespread interest in the highway field. First was a regional conference, opening June 1, held by the Highway Traffic Advisory Committee in San Francisco in its work of compiling data for the War Department, at which truck and bus inventories received special attention. This was followed by a gathering of Western regional members of the American Association of Motor Vehicle Administrators. Thus, with W. A. S. H. O. sessions immediately following the earlier meetings, members who came early got the benefit of all sessions.

In the W. A. S. H. O. group postwar construction prospects were discussed, notably the share of Western states in the proposed postwar highway construction bill ($3,000,000,000 per year for 3 yr.). The California State Legislature has already voted to appropriate from the general fund $13,000,000 with which to prepare for postwar construction work. This appropriation is expressly for preparation of plans and purchase of right-of-way so that a prompt and effective start can be made when postwar funds are available.

W. A. S. H. O. officials elected for the ensuing year were: president, Fred J. Grum, Sacramento, Calif., engineer, Surveys and Plans, California Division of Highways; vice-president, Bernard Tuohey, Phoenix, Ariz., Arizona State Highway engineer; secretary-treasurer, W. L. Anderson, Salt Lake City, Utah, chief designing engineer, Utah Highway Department.

ENR editor Bowman on mission overseas

Beginning a journey on May 31 that is expected to take him to the British Isles, Africa and the Near East, Waldo G. Bowman, editor of *Engineering-News-Record* has successfully completed the first part of his trip, across the Atlantic on a troop-ship. He will probably be abroad about three months.

Mr. Bowman, who is travelling as a war correspondent, also is engaged on a special mission concerned with Army and Navy civil engineering activities. He plans to obtain material for a series of articles on military engineering and construction work abroad. In addition he will prepare some special reports on reconstruction and postwar planning developments in Great Britain.

Engaged in observation and interpretation of engineering practice in the United States for the last 18 years, Mr. Bowman is specially qualified to report on foreign activities in which so many American engineers and contractors now are participating. A graduate of the University of Kansas in 1923, Mr. Bowman began his engineering career with the Chicago Bridge & Iron Co. as a draftsman and structural designer. He joined the staff of *Engineering News-Record* in 1925 as an assistant editor and became chief editor in 1940.

Inter-American Highway Diary

Editor's Note—In this second installment of the diary of his trip to report on construction operations along the projected Inter-American Highway, A. N. Carter takes up where he closed the record in last week's issue (*ENR*, June 10, p. 852) at Managua, Nicaragua. From there he carries the record through to the Panama Canal Zone, thus completing the quick trip made down over the highway to get a general impression of the whole undertaking. Returning from Panama he is making a slower trip to permit more detailed study of the varied construction operations. The record of the return trip will be published in subsequent issues.

A. N. Carter, Assistant Editor, Engineering News-Record

May 3—So that we could spend the night at Managua, Nicaragua's capital on Lake Managua, we traveled only until noon today. Our progress along the highway was 96 miles, on the first 30 miles of which little work had been done. The country is hilly and at one place on the road 100,000 cu.yd. of earth will be moved to make a side hill cut of 107 ft. maximum depth and 600 ft. long. However, the rest of the trip was over an excellent macadam pavement completed by the Nicaraguan highway department a few years ago.

Over this section of the road we were accompanied by Lt. Col. W. W. Zass, formerly chief engineer of the Arkansas highway department and Capt. Hugh Jones, chief of operations in the Managua office. Colonel Zass is now head of the Managua office, which supervises all War Department construction in Guatemala, Honduras, El Salvador and Nicaragua.

Upon approaching Managua we dropped in a very few miles from an elevation of about 4,000 ft. to a few hundred feet above sea level. As a result we found Managua, which has a population of about 120,000, extremely warm compared to the mountains to the east.

To spend an afternoon in Colonel Zass's office working on my notes was a decidedly pleasant contrast to the rough traveling experienced in the past few days.

May 4—We left Managua shortly after six o'clock and just at noon left Nicaragua to enter Costa Rica. I traveled in Nicaragua with Major W. A. Ford, area engineer. For the first 30 miles from Managua a good macadam road similar to that encountered upon approaching the city was available. Also much of the remaining 62 miles in Nicaragua was newly graded and surfaced with crushed rock. But travel in Costa Rica made up for the morning's pleasure, as for the most part we traveled by jeep along the right-of-way where the road will be built, but where no grading had been done. Few bridges have been built and one steep hill after another was the order of the day, with plenty of dust in evidence.

For 20 miles we traveled along the continental divide at about 500 ft. elevation. Since we were passing through an area of few towns and along a portion of the road where no occupied construction camps were located, we decided to push on through to the large U. S. Engineers camp at Las Canas.

At dark we still had about 15 miles to go and immediately lost an hour by following the wrong ox trail making it necessary to turn back. This road was not built for speed by jeep or otherwise. Finally, at ten o'clock—dirty, tired and hungry—we reached the Las Canas camp.

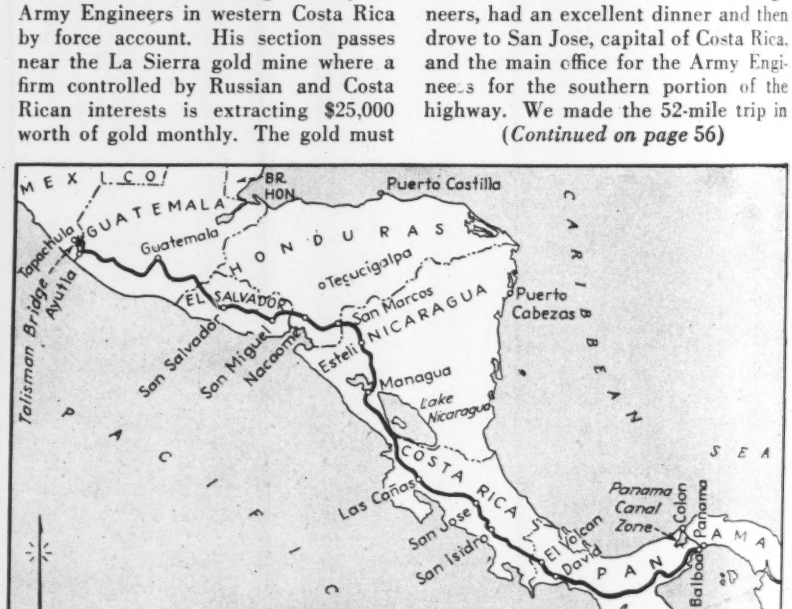
In addition to Colonel Kelton, Major McNamara, Belyea and Rugg, our party now includes Col. E. E. Valentini, Maj. M. N. Thompson, and Capt. Jack Yount, all of the San Jose, Costa Rica office, U. S. Engineers. The latter three had been waiting for us at Managua.

May 5—Spent the early part of the day with Neal Wilson, resident engineer for 20 miles of road being built by the Army Engineers in western Costa Rica by force account. His section passes near the La Sierra gold mine where a firm controlled by Russian and Costa Rican interests is extracting $25,000 worth of gold monthly. The gold must be "flown out" and supplies generally are delivered the same way.

Along a 15-mi. stretch of road yet to be built northwest of San Ramon, Costa Rica, we followed an old ox cart trail, in places cut to a depth of 20 ft. by travel and erosion, but for the most part sufficiently wide for a jeep. Despite the heavy rain that occurred shortly after noon, our jeeps with chains on all four wheels took the frequent 25-percent grades in their stride.

In a very few miles we climbed from an elevation of a few hundred feet to about 4,000 ft. At times we were traveling along the side of a mountain where a skid would have meant a drop of several hundred feet. Soon after darkness fell we arrived at the San Ramon sub-office of the U. S. Engineers, had an excellent dinner and then drove to San Jose, capital of Costa Rica, and the main office for the Army Engineers for the southern portion of the highway. We made the 52-mile trip in

(*Continued on page* 56)



Route of the Inter-American Highway, which is the strategic link of the Pan-American highway system through Central America. It is 1,530 miles in length.

Leonard P. Wood retires, New York water engineer

Leonard P. Wood, a senior civil engineer with the Board of Water Supply of the City of New York, has retired after 37 years' service. Coming from construction with the Metropolitan Water Board of Massachusetts, and from design with the Charles River Basin Commission of Boston, Mr. Wood entered the service of the Board of Water Supply in 1906 in the designing division—on the day that division was organized.

Mr. Wood served successively as assistant engineer, assistant designing engineer, designing engineer, on the personal staff of the department engineer, in the headquarters department, and on the personal staff of the chief engineer. During World War I he served as captain and major of engineers, Service of Supply and Office of the Chief Engineer, A.E.F. in France. His address will be 118 Ralph Ave., White Plains, N. Y.

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Covered highway bridge preserved as landmark

Preservation of the historic covered bridge over Flat Rock River on State Route 52 near Rushville, Ind., has been authorized by the Indiana State Highway Commission, according to S. C. Hadden, chairman. This excellent example of pioneer bridge construction will become the central feature of a roadside park, plans for which now are being prepared for the commission's approval. This bridge, in disuse since being replaced by a new structure in 1941, is regarded as one of the best examples of the many covered bridges erected throughout central Indiana by the Kennedy family.

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Engineer Corps observes its 168th anniversary

This week occurred the 168th anniversary of the founding of the Corps of Engineers of the U. S. Army.

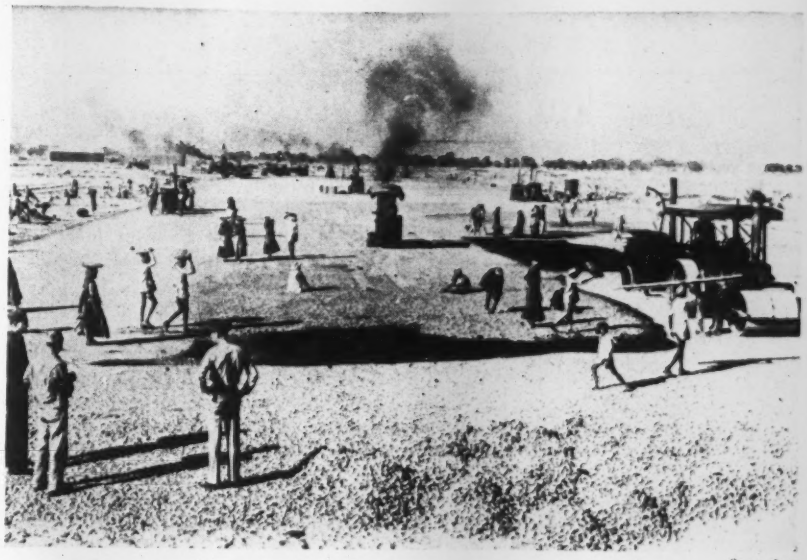
On Saturday evening, June 19, Maj. Gen. Eugene Reybold, chief of engineers, U. S. Army, is expected to talk on "Engineering the Victory" over the Columbia Network. Brig. Gen. C. L. Sturdevant speaking from New York, is to dramatize the construction of the Alcan Highway on the Death Valley Days program. Maj. Dale Savage, who commanded the battalion that took part in landing operations in Africa, will bring the week's celebrations to a close on Sunday by broadcasting African experiences, and outlining a pattern as to what may be expected concerning invasion of Europe.

The anniversary has been used to stimulate the sale of Victory Bonds. All over the country, in city post offices and on village squares, there have been displays of war equipment placarded with cost figures, and inviting their "purchase" in war bonds.

On the sixteenth day of June, 1775, a single act of the Congress not only made General Washington Commander of the Continental Army, but also created the Corps of Engineers by establishing the position of chief of engineers. Since there were no technical schools in the country and only few technically trained men, most of Washington's engineers were of the French Royal Engineers, and because France was a neutral country, those of her engineers who were actually assigned to positions here were officially on leave.

It was upon recommendation of Maj. Gen. Louis Lebeque du Portaile, who organized the Corps of Engineers, that West Point was built. The school was first set up for the training of engineering officers, and until 1866 was strictly a military academy of engineering. Even today, the top ten men at West Point are still given the opportunity of being assigned to the Corps of Engineers. In this connection, history shows that most of the generals in both armies of the Civil War were engineer officers.

Though road, rail and bridge construction have seen great changes since that day, perhaps the greatest innovation is in the part Army engineers play in air power. Today the airborne engineer is being carried with all his equipment thousands of miles to build airports from which a modern air force can operate.



Press Assn.

Field made ready at a U. S. air depot in India

This picture well illustrates the fact that we are engaged in a truly global war. It shows workmen surfacing a runway for planes at a United States air depot "somewhere in India," while American officers inspect the job.

Runway construction and grading of the field was done by Indian army engineers under the Lend-Lease setup.

Sewage works group will hold war conference

Sanitation activities under wartime conditions will keynote the second annual conference of the Federation of Sewage Works Associations, to be held in Chicago on October 21-23, preliminary plans for which have been announced by F. W. Gilcreas, chairman of the program committee.

Of special interest to operators, municipal officials and manufacturers will be the appearance of A. M. Rawn, recently appointed engineering consultant to the War Production Board, who will define priorities procedures for those engaged in sewerage construction, operation and maintenance activities. Mr. Rawn, who is vice-president of the federation, will explain the details of making applications for ratings, and will be available to answer specific questions.

Another session of the conference will be devoted to sewage disposal practice and problems in army camps, the handling of industrial wastes under emergency conditions, and the relation of sewage treatment to the transmission of virus diseases.

With a view toward future developments, the conference will also provide an opportunity for a discussion on postwar activities. This will be conducted by Morris M. Cohn, editor of *Sewage Works Engineering*, assisted by representatives from municipalities, states, consulting firms and manufacturers.

Manufacturers' exhibits will be limited.

Inter-American Highway Diary

(*Continued from page 54*)

about two hours over a crooked bituminous road that is to be made a part of the highway as soon as possible. This section of the highway was built several years ago by the Costa Rican government.

It has been raining daily in the San Jose area and Colonel Kelton has ordered that the trail we had followed to get to San Ramon be closed because of the hazards in using it.

Engineers in the San Ramon office were surprised to learn that we had driven over 980 miles of the highway in the seven days we have been traveling. Also, we have gained a little notoriety by being the first group to travel the full length of the final location from the Mexican border to San Jose. It might be added that we were but 2½ hr. behind schedule when we arrived at San Jose according to the itinerary prepared originally by Colonel Kelton.

A stop at San Jose

May 6—A day most enjoyable because of the opportunity to "stay put" in San Jose, Costa Rica for a few hours and to work on my notes. Not only is the 3,900-ft. elevation of San Jose refreshing, but the city itself compares favorably with many of the Central American capitals we have visited. It is located in a beautiful valley surrounded by mountains.

Food, transportation rates, rent and other costs have risen since the American highway engineers arrived in San Jose in numbers, yet all the engineers to whom you talk are glad to be here instead of in some of the hotter Central American cities, or some outlying camp.

Considerable time was spent in the office of Major R. J. Allan, head of the engineering division at San Jose and in charge of design for the work in Costa Rica and Panama. Major Allen was with the California Division of Highways for many years.

May 7—On the move again. We were up at five o'clock and left the San Jose airport in two U. S. Army engineer planes at 6:30. Our party included Colonel Kelton, Major McNamara, and Captain F. K. Mittry, area engineer for the work south of San Jose.

The first hour was over the 71-mi. section of the road being built by the Ralph E. Mills Co. for the Public Road Administration. For the most part the highway passes through the heaviest jungle we have seen and perhaps as heavy as there is in Central America. The new construction was a beautiful sight as we flew at 12,000 ft. and saw the highway below as it circled, and then climbed to 10,900 ft. For long stretches at more than a mile high the highway follows the Continental Divide.

We stopped briefly at San Isidro, a small town isolated as to highways until the Inter-American Highway construction was begun. Near the village there is a camp built by Ralph E. Mills Co., and another by the Martin Wunderlich Co., which has a 154-mi. section of the road to the southeast in Costa Rica and Panama. San Isidro will soon be accessible by highway, since the Mills organization is now completing at large cost a 21-mi. access road to connect San Isidro with the Pacific Coast port of Dominical. The cost of this access road is but an indication of the difficulties involved in gaining access to the Inter-American Highway in isolated areas. However, to build the highway with the speed desired, work had to be started at as many points as possible.

Our stop at San Isidro permitted us to visit the Wunderlich camp where I got to see Frank O. Short, assistant superintendent for Wunderlich, and Ted Kister, inspector for the U. S. Engineers.

Panama border reached

Our next stop was El Volcan, camp of the Wunderlich Co. located at an elevation of 4,600 ft., just south of the Panama-Costa Rican border. This camp, because of its elevation, was once considered for a hospital. Here I met George W. Kinney, general construction superintendent, and L. M. Post, formerly of New York City, and superintendent of grading for Wunderlich.

At El Volcan we left our air pilots and began an inspection of Wunderlich's road by jeep. Early in the afternoon, we reached Boqueron Camp, used by Wunderlich some 20 miles to the south of El Volcan. With Jack A. O'Leary, now a resident engineer for the U. S. Engineers, and for several years with the Los Angeles County engineering department, we drove over the 15-mi. section of road under his supervision.

Because a rain started about five o'clock, or just as we returned to Boqueron Camp, we were glad to call it a day. The evening provided an opportunity to get acquainted with Charles Bowman of Chicago and Gilbert McAdams of Deer River, Minn., the two top men for Wunderlich on this part of the job.

May 8—Yesterday was a holiday compared to today's activities. We left Boqueron Camp at 6:30 a.m. and drove southward over the newly constructed highway to the Pan American Airport at David, Panama.

At the airport, Colonel Kelton and Major McNamara left us to fly to San Jose, Costa Rica. The rest of the group, consisting of Captain Mittry, Rugg, Belyea, O'Leary, John McCormack, assistant to O'Leary and for seven years with the Arizona State Highway Department, and myself, headed eastward toward the Canal Zone. It was then that our trouble began.

Old road to be used

The road changed from new construction to a rough, narrow road surfaced by the Panamanian Government several years ago with crushed rock. After 118 miles of this rugged riding we encountered 117 miles of old black top—also narrow and rough. In addition, on these two stretches we crossed 60 bridges, built mostly between 1930 and 1940, of only 10-ft. roadway width. On this ride we gave thanks for a recent law passed by the government of Panama that requires everyone to drive on the right side instead of on the left, as in the past, otherwise we might have had a wreck.

Despite its limitation, this road is not to be improved. The Corps of Engineers and the PRA believe they have sufficient road under construction to keep busy for some time with the equipment now available. In addition, the road is suitable for all the traffic it will need to carry until the whole highway north of Panama is completed.

Our road troubles came to an end at the town of Rio Hato where the road suddenly changed to a 20-ft. concrete roadway, completed two years ago under PRA supervision. This construction continued for another 75 miles.

Eventually, tired, hungry and dirty, we arrived at the Panama Canal Zone, after a 310-mile drive that consumed nearly 12 hours.

A strange experience during the drive was to see the Pacific Ocean, which had been to the south of us after we left David, to the east as we neared Panama City, due to the fact that the highway actually is running north as it approaches the Canal Zone.

New troubles awaited us upon reaching the Canal Zone, for someone had forgotten to wire the Tivoli Hotel and we had no reservation. Such trouble is considered serious in this overcrowded area, but eventually we found reservations at the Central Hotel.

(*To be continued*)

A. W. Brandt dies, late N. Y. public-works head

Arthur W. Brandt, 55, who up to May had been superintendent of the New York State Department of Public Works since March, 1939,

died in Washington, D. C., on June 11 after a brief illness. Mr. Brandt had announced recently that he would open an engineering and consultant office in Albany.

A native of Wayne County, N. Y., Mr. Brandt was graduated in 1912 from the Tufts College School of Engineering, entering state service immediately afterward. Since that time he had left the service for only four years, two during World War I when he was in France with the first combat regiment of engineers and second while Nathan L. Miller was governor in 1921 to 1922.

Between 1912 and 1917 he worked on the state canal and highway system. After his honorable discharge from the army in 1919 he became secretary to the second deputy highway commissioner, serving in that post until 1920. When Mr. Miller succeeded Governor Smith, Mr. Brandt left the state service with superintendent Greene and other department heads. With the return of Mr. Smith as governor in 1923, Mr. Brandt reentered the division of highways as second deputy commissioner. In the reorganization of the state government which followed in 1924, Mr. Brandt became commissioner of the division of highways, holding that position until he succeeded Greene as superintendent of public works. As head of the division of highways, Mr. Brandt had general supervision of all highways and bridges constructed, maintained or improved through state funds as well as the construction and maintenance of state parkways.

Of Mr. Brandt, Governor Thomas E. Dewey said, "Captain Brandt's death is a great shock to all of us who had the pleasure of knowing him and working with him. He was a fine public servant and his passing will be a great loss to the engineering profession."

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Treasure Island wanted as postwar naval base

Secretary of the Navy Knox has stated that the Navy is going to retain Treasure Island in San Francisco harbor as a key unit of its expanded main home base for the Pacific fleet after the war.

JOBS OF THE WEEK

APARTMENTS, Manchester, Conn.
Manchester Homes Corp., New York, N. Y., will construct apartments, Main St. by own forces. Estimated cost $750,000.

BUILDING, Ohio
Carl E. Erickson Co., Chicago, Ill., has been awarded contract for the construction of building by U. S. Engineers, Pittsburgh, Pa. $1,439,500. Wilbur Watson & Associates, Cleveland, O., are engineers.

WATER PIPE LINE, Corpus Christi, Tex.
Ernest Lloyd, Fort Worth, and Aiken & Hinman, Corpus Christi, were lowest bidders on 16 miles 39-in. water pipe line, a pumping plant and 10,000,000-gallon reservoir, at $1,046,222. Myers & Noyes, Corpus Christi, are engineers. Federal Works Agency, Fort Worth, opened bids.

HOUSING, Michigan
B. W. Handler Construction Co., Chicago, Ill., was the lowest bidder on housing project when Public Housing Authority, Cleveland, Ohio, opened bids. The low offer on masonry was $551,000; the low offer on frame $524,000. Garfield, Harris, Robinson & Schafer, Cleveland, are architects.

RUNWAY and TAXIWAY, Louisiana
U. S. Engineers, Little Rock, Ark., awarded contract to Weymouth Construction Co., Milwaukee, Wis., for concrete runways, taxiway, grading, drainage, and accessory work at Army Air Forces installation in Caddo Parish. The project will cost in excess of $1,000,000.

IMPROVEMENTS, Florida
Brinson Construction Co., and J. L. Cone and J. D. Manley, Tampa, Fla., have been awarded contract for improvements in Hillsborough County, by U. S. Engineers, Jacksonville, Fla. Cost is less than $1,000,000.

EXCAVATION, DAMS, etc., Mississippi
W. E. Callahan Construction Co., Dallas, Tex., was the lowest bidder for excavating 2,920,000 cu.yd. channel, excavating and constructing two small dams, drainage structure, on Casidy, Moore, Whiting and cut-off Bayous, in Quitman and Coahoma Counties when the U. S. Engineers, Vicksburg, Miss., opened bids at $940,125.

APARTMENTS, Fort Worth, Tex.
L. G. Corrigan, Dallas, Tex., has been awarded the contract to construct apartment buildings for Parkview, Inc., Dallas, at $887,000. W. W. Ahlschlager, Dallas, is architect.

HARBOR SEAWALL CONSTRUCTION, Mexico
Department of Federal Public Works, Mexico City, and State of Vera Cruz, Vera Cruz, Mexico, will construct by force account additional harbor seawall construction. Estimated cost is $600,000.

BUILDINGS, Texas
U. S. Engineers, Denison, Tex., awarded contract for the construction of buildings, Cooke County, to J. W. Bateson Co., Dallas, $886,000.

HOUSING, Vancouver, B. C.
Smith Brothers and Wilson, Ltd., Vancouver, B. C., awarded contract three hundred houses, roads, sewers, ditches at Sea Island by Vancouver Housing, Ltd., Toronto, Ont. Estimated cost is $800,000. McCarter & Nairne, Vancouver, B. C., are architects.

IMPROVEMENTS, Stillwater, Tex.
Texas Bitulithic Co., Dallas, Tex., has been awarded contract for airport construction, by Civil Aeronautics Administration, Fort Worth, at $588,194.

ROADS, Pennsylvania
Pennsylvania State Highway Department, Harrisburg, Pa., received lowest bid on concrete paving roads in Philadelphia and Delaware Counties from Fred Berlanti & Son, Inc., Harrison, N. Y., at $500,810.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 151.

OBITUARY

Col. Millard Angle Butler, 62, who in the last half century engaged in engineering work in several different states and countries, died at Charleston, W. Va., June 4. Colonel Butler was supervising engineer of the Defense Plant Corporation at the Institute Synthetic Rubber Plant at Charleston. He was previously engaged in engineering work in Russia, China, Iraq and Iran. He was at one time chief engineer of the Great Northern Railroad. During the first World War he supervised construction of the Norfolk army base and had charge of the building of several cantonments elsewhere.

William Herzberg, chief construction engineer of the Alabama state highway department, died June 4. Mr. Herzberg was graduated in civil engineering at Sewanee University. He became associated with Tennessee Coal, Iron & Railroad Co. and is credited with laying out the steel plant and the city of Fairfield. He joined the state highway department when it was organized and held posts from assistant division engineer up to chief construction engineer.

Luis Urquijo y Perez, age 55, noted Mexican civil engineer and geographer, director of the Mexican military geographic corps, died recently in Mexico City.

M. B. Clark, assistant chief engineer of Santa Fe Railroad's coast lines, with headquarters in Los Angeles, Calif., died in San Bernardino May 28.

Charles J. Fleck, 71, founder of the Fleck Construction Co., Milwaukee, Wis., and active in the city's building industry for fifty-two years, died May 26. Mr. Fleck constructed the Milwaukee auditorium and many other important buildings.

Edwin J. Bassett, 57, district office engineer for the state division of highways at Redding, Calif., died there June 2. He had been an employee of the state division of highways in that district for the past 31 years.

John D. Greene, 59, associate engineer for the state division of highways, California, died in Sacramento on June 4. Mr. Greene had been associated with the state division of highways at intervals since 1915.

Frederick Walter Thorold, 70, former engineer with the Works Department of the Toronto, Ont., died there June 3. A graduate in engineering from the University of Toronto in 1900, he practiced as a consultant in Toronto and New York after his service with the city.

George G. Hinish, 59, associate engineer in the United States Engineer Corps, died in Salem, Ore., April 26. Mr. Hinish had been in charge of maintenance of the Willamette River channel above Portland for more than ten years. He had been a member of the Portland District Engineer's staff for more than 37 years.

John T. N. Hoyt 76, chief civil engineer for the Albert Kahn Associated Architects and Engineers, Inc., died recently at Detroit.

Harry T. Bletzacker, 41, engineer of Wasatch and Utah co[illegible]nties and engineer of Murray and Midvale, U[illegible] died recently.

Edward E. Barnett, 7[illegible], retired engineer of Boca Raton, Fla., and merly of Chicago, died recently at home in Florida.

Lyman P. Hubbell, 68, member of firm of Darling & Hubbell, Buffalo, there on May 21. He served for [illegible] years as a senior engineer of the department of Public Works and in joined Darling & Hubbell in engineer and land surveying.

News of the Week
Continued on p. 126

CONTRACTS AND CAPITAL

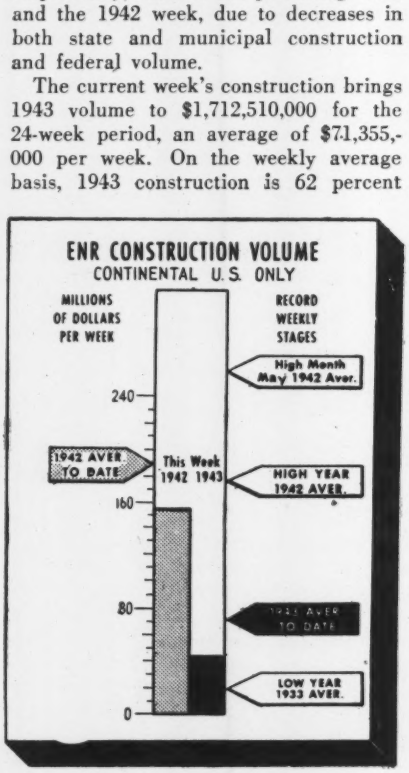
CIVIL ENGINEERING construction volume in continental U. S. totals $44,234,000 for the week. This volume, not including the construction by military combat engineers, American contracts outside the country, and shipbuilding, is 37 percent below a week ago, and is 72 percent below the volume reported for the corresponding 1942 week.

Private construction declines 30 percent from the preceding week, and is down 44 percent from a year ago. Public work is 37 and 74 percent lower, respectively, than in the preceding week and the 1942 week, due to decreases in both state and municipal construction and federal volume.

The current week's construction brings 1943 volume to $1,712,510,000 for the 24-week period, an average of $71,355,000 per week. On the weekly average basis, 1943 construction is 62 percent lower than the $4,746,455,000 repo[illegible] for the 25-week period last year. Pri[illegible] construction, $219,272,000, is down [illegible] percent, and public construction, [illegible] 493,238,000, is 65 percent lower w[illegible] adjusted for the difference in the n[illegible] ber of weeks.

In the classified construction gro[illegible] sewerage is the only class of wor[illegible] report an increase over a week ago. [illegible] commercial building and large-s[illegible] private housing is the only classifica[illegible] to gain over the 1942 week.

New capital for construction purp[illegible] for the week totals $2,937,000, an[illegible] made up entirely of state and munic[illegible] bond sales. The new construction fi[illegible] ing total for the 24 weeks of 1943, $[illegible] 337,000, compares with $6,872,345 for the 25-week period a year ago.



CONTRACTS

Continental U. S. Only
(Thousands of dollars)

	Week Ending June 18 1942	June 10 1943	Jun[illegible]
Federal	$136,232	$51,266	$34[illegible]
State & Municipal	8,231	9,445	[illegible]
Total public	$144,463	$60,711	$37[illegible]
Total private	11,207	8,933	[illegible]
TOTAL	$155,670	$69,644	$44[illegible]
Cumulative 1943	(24 weeks)		$1,712[illegible]
1942	(25 weeks)		$4,746[illegible]

Note: Minimum size projects included [illegible] Waterworks and waterways projects, $15[illegible] other public works, $25,000; industrial b[illegible] ings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1942 25 weeks	Cumulative 194[illegible] 24 w[illegible]
NON-FEDERAL	$333,390	$95[illegible]
Corp. Securities	136,459	[illegible]
State & Mun.	149,512	[illegible]
R.F.C. loans	47,419	[illegible]
FPHA loans	.....	[illegible]
Federal	$6,538,955	$49[illegible]
TOTAL CAPITAL	$6,872,345	$49[illegible]

ENR INDEX NUMBERS

Index Base = 100		1913
Construction Cost	May '43	289.87
Building Cost	May '43	227.64
Volume	Apr. '43	225

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Priority on Design Method for Eccentrically Loaded Columns

Sir: In the article, "Beam Method of Design for Eccentrically Loaded Columns" (*ENR* Mar. 11, 1943, p. 365), it is stated that this design method was first presented by the author, Prof. Odd Albert, last May, in a lecture before the School of Engineering, Princeton University.

This statement, as well as letters published in *Engineering News-Record* May 6, 1943, p. 663, including a reply by Professor Odd Albert concerning the degree of priority which should be credited to him for the beam method, may leave your readers with a number of misconceptions which require clarifying.

The writer therefore wishes to make the following statements:

1. In April, 1942, Prof. Odd Albert requested an opportunity to present a new method for the design of eccentrically loaded columns to students of the writer's class in reinforced concrete at Princeton University. Not knowing at the time the exact nature of the allegedly new method, the writer arranged an informal evening lecture for Prof. Albert.

2. In closing the discussion at the end of Prof. Albert's lecture, the writer pointed out that the method presented was identical to a method which the writer was taught as a student at Charlottenburg, prior to his graduation there in 1925; also that this method had been developed then even further than this was now done by Prof. Albert. Tables based on this method have been published for at least fifteen years in the *Beton-Kalender*, a handbook extensively used by most reinforced concrete designers in Central Europe and in many other countries.

3. On pp. 327-331, Vol. I. of the 1928 edition of the *Beton-Kalender* is given a method identical with that presented by Prof. Albert. The presentation of the subject in *Beton-Kalender*, however, developed this method even further, as can be seen from the following summary of the discussion as given there.

The bending moment was referred there to the tension steel and (using American notations) was given as being equal to:

$$M_s = M + N\,(h/2 - d') \qquad (1)$$

The effective depth of the beam was to be found from:

$$d = \alpha \sqrt{M_s/b} \qquad (2)$$

where: $$\alpha = 1/\sqrt{K'} \qquad (3)$$

The tension and compression steel was to be found from:

$$A_s = pdb - N/f_s \qquad (4)$$

$$A'_s = p'db \qquad (5)$$

The coefficient α was given not for tension steel only, as this was done by Prof. Albert through the corresponding reciprocal K values, but was indicated for numerous combinations of varying percentages of tension and compression steel p and p′. A complete table of the interrelated values of α; p; and p′ for varying values of f_s and f_c was also provided. However, this table was valid only for $n = 15$ and $d'/d = 0.07$. The *Beton-Kalender*, 1928, credited this method and table to G. Ehlers, stating that it was published in *Armierter Beton*, 1918; H.2.

Under the circumstances, a further discussion concerning priority on this method appears superfluous, but we certainly do not want anyone to think that it was first presented at Princeton last year, as was stated in the headlined "Contents in Brief" of Prof. Albert's paper in *Engineering News-Record*.

4. This twenty-five year old so-called beam method for the design of eccentrically loaded columns has, nevertheless, considerable merits as such, especially if its practical application is facilitated by appropriate tables and charts. Such tables are so far available only for stress values given in metric units. The coefficients K′; p; p′; given above in formulas (3); (4) and (5) can be computed and/or related to each other in any units from the following formulas:

$$K' = f_c\left[\left(\frac{2n^2 + 3rn}{6\,(n+r)^2}\right) + np'\,(1 - d'/d)\left(1 - \frac{d'\,(n+r)}{d\,n}\right)\right] \qquad (6)$$

and:

$$p = \frac{n}{2r\,(n+r)} + \frac{p'}{r}\left[n - \frac{d'}{d}\,(n+r)\right] \qquad (7)$$

where: $r = f_s/f_c$ and $p' = \dfrac{A'_s}{bd}$

The derivation of these formulas is identical in procedure to the one followed in ordinary reinforced concrete design. It can be seen that tables and charts can be easily constructed for fixed values of n and d′/d. It is to be hoped that such tables or charts will be drawn up by someone in English units.

The use of charts and even of formulas in reinforced concrete student instruction is sometimes objected to on the grounds that they are but substitutes for thought, as was done by Prof. Charles A. Ellis (*ENR* May 6, 1943, p. 663), in his comments on the paper by Prof. Albert.

The importance and the necessity of teaching students how to develop formulas or to solve practical problems from basic principles of mechanics are not to be contested. However, students should also be taught how later to put this knowledge to most efficient use in actual design practice, through the intelligent employment of proper accessories. Otherwise, students are apt to disregard tables and charts in later life, with a resulting unjustifiable waste of time on design problems.

Charts and tables are much less frequently used for reinforced concrete work in America than they are in Europe. The resulting waste of engineering manpower is considerable, and should be particularly objectionable in times of national stress. The writer believes that extremes in university instruction methods similar to the ones advocated by Prof. Ellis are responsible for this situation. Attempts to completely divorce theory from design practice, in the belief that the latter should be exclusively taught in offices after graduation, do not appear justified by the results of this policy.

Nobody would suggest omitting machinery or other labor saving devices from industrial instruction on the grounds that they were but substitutes for laudable exertion. Why, then, advocate a similar course when dealing with reinforced concrete design?

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EDITORIALS

VOLUME 130 NUMBER 24

June 17, 1943

To Wearers of the Castle

THE CORPS OF ENGINEERS passes another landmark in its long and honorable history this week that under other circumstances may not have called for special comment. But the passing of the corps from its 168th to its 169th year marks an important change in emphasis in its activities. The year just closing saw the approaching completion of a construction program directed by the corps that amounted to nearly eleven billion dollars, of which all but two billion was carried out within the continental limits. Thus, the 168th year for the Corps of Engineers saw its activities still concentrated in this country. But in the year ahead the bulk of activity will be transferred to foreign shores under the direction of a vast number of engineers and construction men who wear with pride the "castle" that for so many years has signified service with the Corps of Engineers. We salute them, knowing that the great task is in able hands.

Singleness of Purpose

JOHN F. STEVENS, on the 50th anniversary of his discovery of Marias Pass through the Rocky Mountains, when asked by the editors of this journal for a message to the young engineers just starting their careers, sent the following telegram: "I have always given every effort of mind and body to make a success instead of a failure, and have tried to let no physical obstacle prevent accomplishment. To young men I would say, do one thing at a time and do it to the best of your ability." One cannot but conclude, upon a rereading of Mr. Stevens' account of some of the high points in his career as set forth in the fascinating group of biographical sketches that he wrote for *Engineering News-Record* in 1935, that singleness of purpose backed by an indomitable will was the outstanding characteristic of John F. Stevens. On the winter's night in which he discovered Marias Pass, deserted by his Indian companion, he pressed on until convinced that he had found a route for a rail line through the Rocky Mountains; and as night fell before he could get back to his base, he tramped back and forth on a path beaten in the snow to keep from sleep and danger of freezing to death. Similarly, when Theodore Roosevelt asked him to bring order out of chaos in Panama, he burned all his bridges behind him by insisting on absolute authority, realizing that failure under such circumstances would be the responsibility of no one but himself. He then went through all the restrictions that stood in the way of the objective he had in view. Success marked the undertaking, but it did not come without the other qualities that Stevens commended to young men—faith and imagination. Faith in himself and in the ability of those to whom he delegated authority, and imagination to see his objective before it began to take concrete form. Thus the career of John F. Stevens might be summed up as singleness of purpose, faith and imagination.

Attacking Dams from the Air

UNTIL THE MIDDLE OF MAY our knowledge of what effect air attacks would have on dams was largely a matter of speculation. Then on the night of May 16-17 the Royal Air Force staged its spectacular attack on Moehne and Eder dams in the Ruhr district of Germany. The attack was as successful as it was spectacular. Abandoning normal bombing methods, presumably because of the difficulty of placing explosive charges by that means at points where they would do serious harm to the dams, the R.A.F. resorted to dropping mines from low altitudes so that they could be detonated below the water surface close to the dam where their explosive forces would be highly effective. Both dams were seriously breached, as may be seen in the remarkable airviews reproduced on pages 891 and 894 of this issue. The success of that attack has served to stimulate renewed interest in the possibility of similar attacks being made on dams in this country. Consideration of the subject is fully justified—for no possibility of this kind should be overlooked in wartime—but there appears to be no reason to be alarmed lest the possibility become a probability. German or Japanese bombers could bring to our shores only a small fraction of the bomb load carried by the R.A.F. to Germany, and they would come in fewer numbers and would be more exposed to attack, thus reducing the chance of their reaching their objective. But the more important factor appears to be the fact that an attack of that kind would not be as spectacular or as effective in upsetting public morale as would a raid with bombs and incendiaries over one of our big cities. Further, no single reservoir or pairs of reservoirs in this country the

ight be damaged by air attack could cause as uch injury to war industries as did the attack Moehne and Eder dams. If German or Jap ers come to our shores, it appears most probable at cities, not dams, will be their objective.

ar Prisoners on Construction

N ANNOUNCEMENT in Washington recently that er 36,000 prisoners of war have been brought this country and are being put to work on tasks ot directly connected with war, and intimations at the number brought might eventually be as gh as 200,000, raises question as to what part ese prisoners may play in construction. Detailed lans for their use are yet to be made public, but e War Department has indicated that in addition agricultural work they may be employed on oads and on dam construction, operations on which ey could be used in large and easily controlled roups. However, the restrictions under which ese prisoners may be employed, which were set p in the Geneva Convention and have been supplemented by our government, seem to limit the xtent to which they can be used, at least on construction work.

The prisoners may not be employed on work irectly connected with the war effort. If that restriction is broadly interpreted it would seem to reclude their use on road work, because the nly road operation that can be carried out at the resent time is that which is certified as being essential to the war effort.

Our government has ruled—presumably to heck an outcry from leaders of organized labor—hat prisoners of war may be used only in regions here the War Manpower Commission has determined that there is a shortage of the type of labor ey will supply. The rapid decline in construction at has taken place in recent months indicates hat there will be no scarcity of construction labor n most parts of the country by the time many war risoners are available. Many men thrown out of ork by the sharp curtailment of new work have one into war industries or military service, but e very type of labor that prisoners could be exected to replace—the common laborer lacking bility or initiative to get himself a war job—still ill be plentiful.

Finally, prisoners of war must be paid at prevailing rates of pay—though only 80 cents per day of that pay goes to the prisoner. This would seem to be another deterrent to their use on construction. Such labor would not be efficient, hence it hardly seems possible that a contractor would seek prisoners of war as laborers on a job unless absolutely no free labor could be found.

In the light of all these considerations, it does not appear probable that the construction industry needs to concern itself much about the possibility of having to use prisoners of war.

More Efficiency in Shipbuilding

ADMIRAL LAND, in his Maritime Day talk, stated that this country will produce 19,000,000 deadweight tons of dry cargo ships and tankers in 1943, almost the equivalent of the entire British merchant fleet at the start of the war. Over 700 ships have been turned out so far this year, mostly in emergency type vessels it is true, but nevertheless in usable ships. These ships were originally expected to require 210 days to produce, later this time was cut to 105 days, and now the average time is only 50 days from keel-laying to delivery. Construction contractors have been in the forefront of achievement in this program.

Production at the rate achieved has been made possible by standardizing on one type of vessel designed to be adaptable to mass production and by staying with that design; but it was attained also by almost ruthless methods of fighting for construction materials and by using prodigious quantities of manpower.

The Maritime Commission now has started an extensive program for producing more efficient ships, speedier, larger and designed as competitive carriers for postwar traffic. With the change to a more efficient design it might be well to examine the efficiency of the building operations. Rush construction will never be free from loss, but there is reason to believe that the cost of our ships may be a handicap to their use in postwar trade unless a large part is written off as a war expense. British shipbuilders state that comparable ships built in their yards cost one-fourth as much as ours and use only one-half the man-hours of labor per ton. Here, surely, is a challenge to American construction men to put our shipbuilding program on a more efficient basis.

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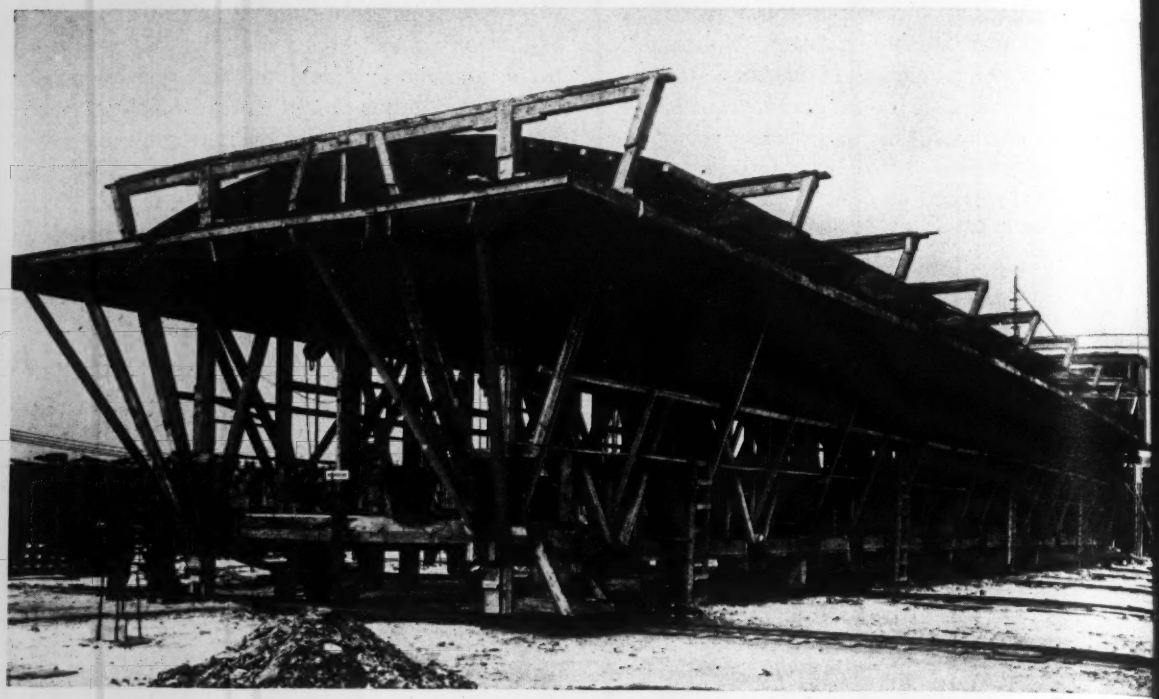

Photo Peter Fa

Fig. 1. Construction "juggernaut" form-traveler moves sideways on rails to new section in 82-acre building.

Building an 82-acre Concrete Roof With Traveling Retractable Forms

***Contents in Brief** — Ribs protruding below a barrel-arch concrete roof required ingenious form planning to permit use of a traveling carriage on construction of a huge war plant. Forms were dropped 4½ ft. to pass under the ribs, then rolled ahead on timber frames supported on artillery wheels; chain hoists were used to raise the roof form to its new position. Over 100,000 cu.yd. of concrete was poured for the 82-acre roof in six months during the fall and winter.*

CONCRETE RIBS extending 4 ft.-3 in. below the roof of the one-story concrete, multiple barrel-arch machine and assembly building of the Dodge-Chicago Plant, Division of Chrysler Corp. presented an unusual problem to the constructors. The building, said to be the country's largest, covers 82 acres and was constructed in six month's during the late fall and winter.

The 3-in. thick, 46-ft. radius arch-roof spans 38-ft., and it is supported on continuous concrete girders on columns at 30-ft. c. to c. The ribs are 5¾-in. wide and 15-ft. c. to c., stiffening the roof so that reinforcing steel requirements for the entire structure are at the unusually low figure of 2.7 lb. per sq. ft. of floor area (ENR, Jan. 14, 1943, p. 31).

It was necessary to devise an arch-slab form that could be lowered 4½ ft. because the ribs otherwise would have blocked movement of the usual traveler, which drops only a few inches for clearance. The form was constructed with a movable section for a 14-ft. length of roof between ribs and a 35½-ft. width between the longitudinal concrete girders. Each such panel was supported and controlled by a pair of arms, 5-ft. apart longitudinally and 18-ft. transversely.

The deck form was plywood resting on longitudinal joists. For raising and lowering, the panel was carried on a truss immediately above each of the raising arms, but when in position for placing it was also supported on a ledger on the vertical studs of the rib sides. The arms, of timber sliding in timber guides, were controlled by a 1½-ton chain-hoist on each of the two frames.

Forms are wood, even to wheels

Forms were built into an all-timber carriage, one arch (38-ft.) wide and four bays (120-ft.) or eight rib-sections long, well-braced throughout, with the form for the rib-soffit built rigidly into the frame. The carriage moved on eighteen 56-in. dia. steel-tired artillery wheels, propelled by a hand-winch operated by four men or was pulled by a tractor. It had a work platform about 5-ft. below the rib-soffit level to accommodate the form erection.

The wheels on the traveler were at 18-ft. gage and moved on 2x12-in.

planks on the concrete sub-floor. In some cases installation of underfloor lines prevented early floor construction and the traveler moved on mud sills, but generally a width of 20 ft. was completed ahead of roof construction to accommodate travel of the heavy timber rig.

Erection cycle

With the traveler in its proper location, the first erection operation was to raise the arch form for the concrete deck about 6-in. higher than its final position, thus providing clearance below for placing of rib and beam sides. The carriage was raised by the screw jacks, Fig. 3, so that the rib bottoms came to the proper height for the permanent structure. The jacks operated under wood columns, situated between sets of wheels and framed so that the load of the form and the concrete was carried principally on the jacks. A vertical post was wedged up under the center of the beam. The wheels for moving were blocked just snugly with wedges to prevent longitudinal movement and to take a small part of the direct load.

After the rib and girder side forms were placed the deck was lowered to its proper level, coming to rest on the rib sides and on the jacking arms, which were blocked by vertical timbers to take the load off the chain-hoists. Forms were then ready for reinforcing steel and for concrete placing, a 48-hour job when working two shifts.

After the required curing period, the wedges under the traveler wheels were removed and the jacks lowered to bring the wheels to the floor. This operation let the rib-soffit forms down, loosening the rib side-forms, making it possible to strip and lay them on the working platform of the traveler. The curved arch form was then dropped to a level below the concrete ribs and the carrier was ready to move and enter a new cycle.

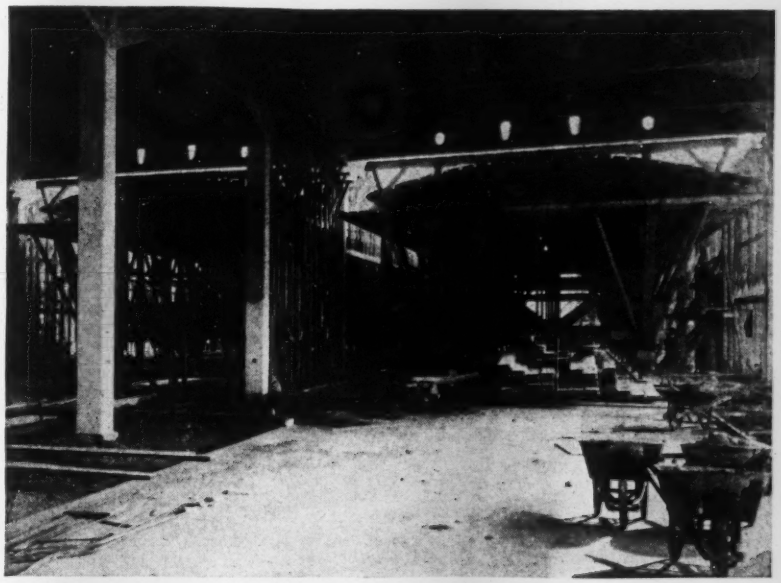

Fig. 2. Ribs, 4-ft. 3-in. deep, at 15-ft. c. to c. require that forms for barrel-arch roof drop for passage. Openings through ribs are for utility lines.

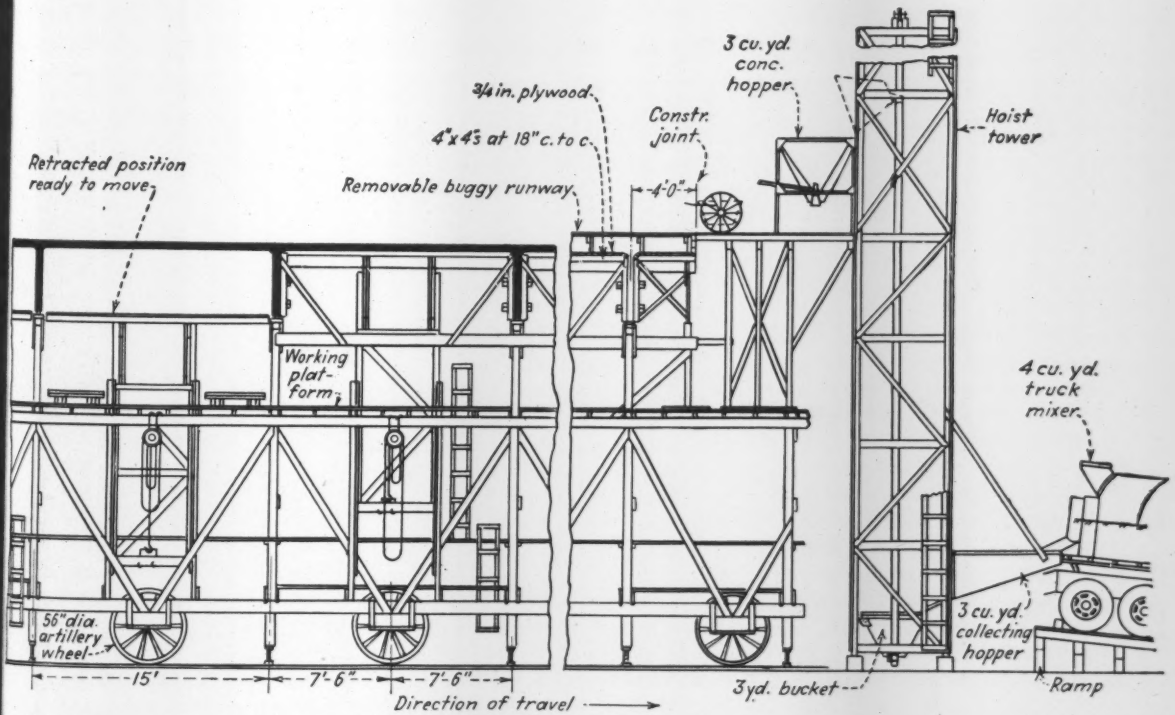

Fig. 3. Forms are built in sections 120-ft. long and 38-ft. wide to move as a unit. One tower hoist serves the concrete placing for a four-bay width, moving ahead with the form.

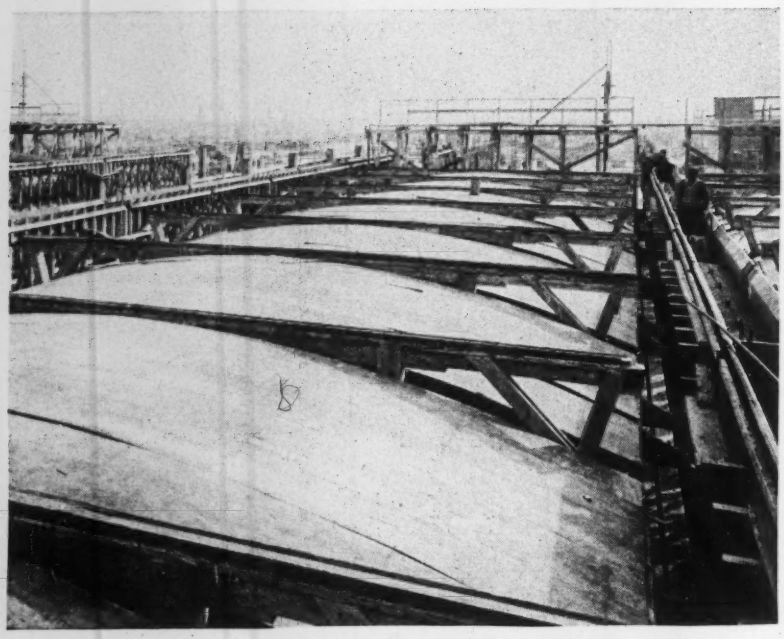

Fig. 4. Form has just been moved ahead and rib bottoms brought to proper elevation by screw-jacks on floor slab. Next, form will be raised (slightly above final level), rib and beam sides placed and the deck form lowered to position.

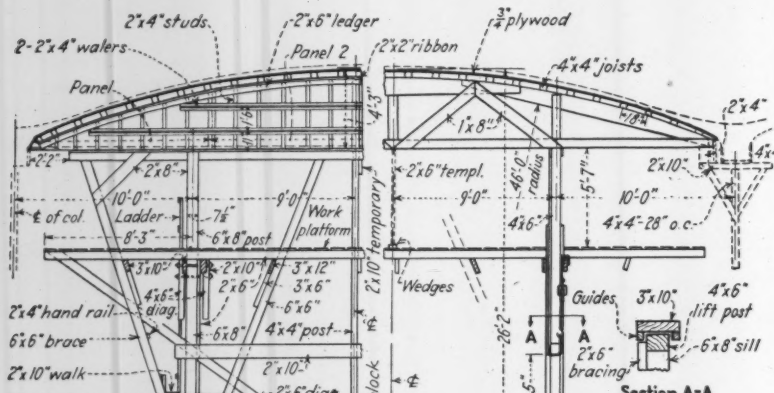

Fig. 5. Detail of form construction showing how screw-jacks, and blocking at center, support the form rigidly while concrete is being placed.

Forms for the concrete girders were supported independently by means of 4x4-in. T-head shores. To maintain the necessary speed of construction, girder forms complete with sides and columns were erected ahead of each carrier. This required extra sets of auxiliary forms but saved on the travellers needed.

Normal cycle for the forms was one week for each unit. Curing period, with high-early strength cement, was 72 hr.; 24 to 30 hr. was required to strip, move and re-erect the forms; 48 hr. was necessary for placing reinforcing and concrete.

Carriage for each bay

Forms were built for each of the longitudinal bays of the structure and started at one end as a battery. Some additional units were started at the opposite end of the structure, working toward the center to complete certain sections as soon as possible. As soon as the concreting in this area was finished both sets of forms were rolled out to one end of the structure and moved transversely to a new location for further use. Transverse movement was accomplished by replacing alternate sets of wheels with small car-trucks and moving the units sideways on narrow-gage rail as shown in Fig. 1. Forms were used an average of fifteen times each.

4,000 yd. of concrete a day

The concrete was placed in units of four bays in width, the fifth bay being delayed until the first units were cured and stripped. This operation involved the deck only, the longitudinal girders having been placed with the previous unit on either side.

More than 400,000 cu.yd. of concrete, to be distributed to 20 structures over an area of 500 acres in a little more than six months made it necessary to provide a mobile means of mixing and distributing concrete. Transit-mixing was adopted, forty 4-cu.yd. truck-mounted units being used to haul from two batching plants set up on the site. Each of the batching plants was capable of charging a 4-cu.yd. mixer in 1¼ min. A maximum daily output of 4,300 cu.yd. from the two plants was attained.

One of the plants used hopper bottom railroad cars for delivery of aggregates with a belt conveyor for delivery to the top of bins over the batching plant. Cranes with clamshell buckets were used for feeding the other plant and could be used in an emergency at the plant equipped with belt conveyor. Bulk cement, handled by screw and bucket conveyors, was used at both plants.

Concrete batching and placing

All ingredients, including water, were weighed in the batching plant and charged directly to the drums of the mixers rather than batching the water through the tank on the truck. Mixing was started as soon as the truck pulled away from the batcher plant, assuring adequate mixing without lost time at point of discharge.

Concrete for the roof deck was delivered to tower hoists, Fig. 3, that dumped into hoppers at roof level, for buggy distribution over runways at the crown of each roof barrel. One hoisting rig was placed at the front of

Fig. 6. Roofed out in six months, this 82-acre working space is now an "Arsenal of Democracy." Bays throughout the building are 30 x 38 ft., ample for efficient handling of machine work.

each unit of four bays and was moved with the forms as they advanced to a new position.

Concrete was kept at a consistency stiff enough to eliminate the top forms on the sloping arch roof but was sufficiently workable to be chuted and shoveled into place. The roof surface was given a wood-float finish and later covered with built-up roofing.

Concreting was continued throughout the winter, using heated materials and enclosing areas so that they could be heated. All the travelling forms built were kept in use so long as space could be found for them to be employed effectively. Multiple shifts were worked during most of the construction period on all parts of the work. This, coupled with careful early planning enabled the contractor to place the 82-acre roof, in fact do most of the structural work on the building in about six months.

The Army Air Force, the Defense Plant Corp., the Chrysler Corp., Albert Kahn Associated Architects & Engineers and the George A. Fuller Co., general contractors, cooperated to speedily complete the construction of one of the largest buildings ever erected.

TVA Apportions Cash in Lieu Of Tax on Power Properties

Payments made to six states by the Tennessee Valley Authority, in lieu of tax money that might have been collected from private power interests, will total $1,960,472 for the fiscal year ending June 30, according to a recent announcement. Partial payments have been made monthly on a basis of preliminary estimates and the last two checks will adjust the total for the year to the amount allotted.

Besides the TVA payments, municipal and cooperative distribution systems are providing for taxes and in lieu payments, which are expected to exceed $1,850,000 for the 1943 fiscal year, bringing total payments on TVA power to more than $3,800,000.

Under the terms of the TVA Act as amended, the Authority's payments for the fiscal year 1943 are computed as 8 percent of gross power revenues for the fiscal year 1942. The resulting amount is then apportioned among the several states in which the TVA carries on power operations in proportion to book value of TVA power properties and power revenues in each state, equal weight being given to each factor.

An additional proviso of the statute under which TVA operates requires that minimum payment to each state, including its counties, shall be the average of former state and local *ad valorem* taxes on purchased power properties and reservoir land allocated to power for the last two tax years prior to acquisition by the Tennessee Valley Authority.

Such former county and district property taxes fix the amounts of payments due directly to the counties, and the sum of county payments in any state is deducted in determining the amount payable to the state government.

Payments to five of the six states increased this year, Mississippi being the only one receiving less than before due to disposal of power facilities in that state.

PAYMENTS BY TVA FOR THE FISCAL YEAR 1943 TO STATES AND COUNTIES IN LIEU OF TAXES.

State	Payments to States	Payments to Counties	Total Payments
Alabama	$340,787	$44,924	$385,711
Georgia	10,777	55,214	65,991
Kentucky	25,682	31,633	57,315
Mississippi	12,986	34,041	47,027
North Carolina	70,391	4,860	75,251
Tennessee	502,130	827,047	1,329,177
Total	$962,755	$997,719	$1,960,472

Sea-Going Barges of Concrete Construction

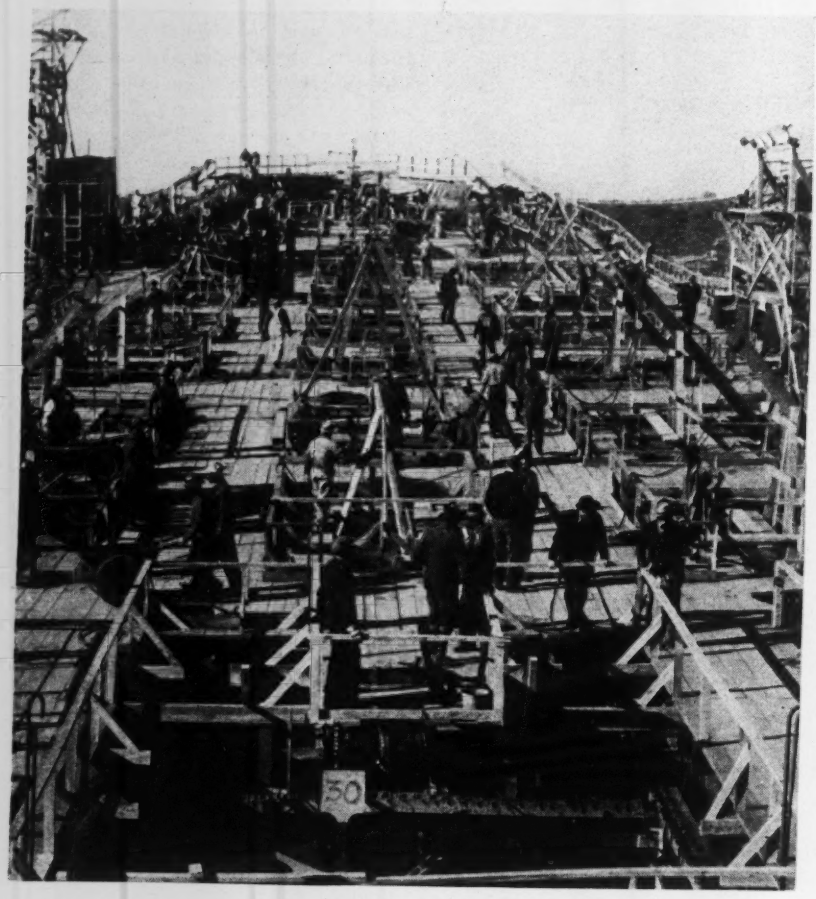

Fig. 1. Concreting almost to the deck of the ship is performed in one lift by distributing concrete to 29 crews who place the material by hand.

***Contents in Brief**—Concrete barges of the conventional shape of a ship are being poured continuously almost to the deck height in a shipyard at Savannah, Ga. Lightweight aggregate with 9¼ bags of cement per cu. yd. makes 5,700-lb. concrete weighing 108 lb. per cu. ft. Longitudinal steel in bottom and deck, butt-welded continuous for the full length of vessels, is pulled in through the prow for placing. Metal used is one-half the weight of that in a comparable capacity all-steel ship.*

OCEAN-GOING HULLS OF CONCRETE are being built on end-launching ways at Savannah, Ga., to serve as oil tankers. Known as barges, because they are not self-powered, these concrete hulls are designed to be towed by ocean-going tugs for delivery of cargoes to any part of the world. They are built to the lines of the best naval architecture and are equipped with power steering devices and winches for handling anchors and towing hawsers. They have accommodations for a small crew to steer, handle the pumps and work the towing lines as well as for a naval gun crew.

Twenty-three ships are now contracted for from this yard. The hulls are 350 ft. long between perpendiculars and 366 ft. overall. They have a 54-ft. beam and are 35 ft. deep at the sides with a 1-ft. rise of the deck to the centerline.

Ship's displacement

These barges have a loaded displacement of about 11,000 long-tons at a 26-ft. 3-in. draft and a deadweight of about 5,500 long-tons. Contrary to usual structural terminology the deadweight is the difference between a ship's displacement at light draft and loaded draft and comprises its capacity to carry cargo. However, for these ships deadweight and lightweight or weight of the ship without load are almost equal. Weight at launching is about 5,200 long-tons as all of the superstructure and most of the machinery is in place.

The center 288 ft. of the hull has concrete frames at 10-ft. 8-in. c. to c. with a transverse bulkhead at each third frame. Between the widely spaced frames in the bottom, sides and deck, the shell is strengthened by longitudinal concrete beams placed integrally with the hull. Longitudinally, there are two bulkheads—one 9 ft. on each side of a low center keelson on the centerline of the hull. The bulkheads divide the ship into 29 principal compartments, typical ones being 18 ft. wide by 32 ft. long and the full depth of the ship. Bow and stern have closer spaced frames making irregular shape compartments used for ballast tanks, chain-stowage and the like.

The walls are thin shells of heavily reinforced, high-quality concrete designed to withstand the buffeting of rough seas. Concrete in the bottom is 5 in. thick, which covers two layers of 1-in. sq. longitudinal bars with a ½-in. round spacer bar between and ½-in. round transverse bars top and bottom. Side shells are 4½-in. thick and bulkheads and decks are 4-in.

Actual weight of all steel used in a 5,500 long-ton deadweight barge is 1,300 long-tons, which, according to the marine architects, is a little less than one-half of the weight of metal required for a steel ship of the same weight carrying capacity. Only steel plate used in the ship is in the stem and stern frame, an advantage in favor of the concrete boat as plates are the real bottleneck of steel production. Designers also point out that smaller concrete ships would require proportionately less reinforcing, citing as an example the 3,500 deadweight ton Polias of World War I, which required only one-third the metal of a comparable steel ship.

These concrete barges are being built on end-launching ways where they can be released into the Savannah River, which has a navigable channel to the sea. General plan is to build the exterior forms in place, set the reinforcing steel for all of the vessel below the deck then place the interior forms. Concrete placing soon follows; on all ships now under construction the concrete is completed in one pour to about 3.5 ft. below the deck line of the ship to avoid having a horizontal joint below or near the water.

The method of construction requires that 80 percent of the reinforcing steel and the forms for practically the entire ship except the deck be in place before concreting starts. About 2,000 cu. yd. of the 2,700 cu. yd. of concrete in the hull is now placed in one continuous pour.

There are six ways at this yard, located about 90 ft. apart to give adequate room for operation of equipment between. Ways have a declivity of $\frac{9}{16}$ in. per ft. Rising ground made it necessary to excavate through a short distance and beyond this required only low bents to raise the ways to the required slope.

Support is on spread footings on timber blocking and bents, spaced 10-ft. 8-in. c. to c. to match the spacing of the concrete frames of the ship. Outboard ways are on piles, built within a cofferdam to permit accurate framing of the launching ways.

Ways are serviced by crawler cranes traveling all around the ships and into the yard when necessary.

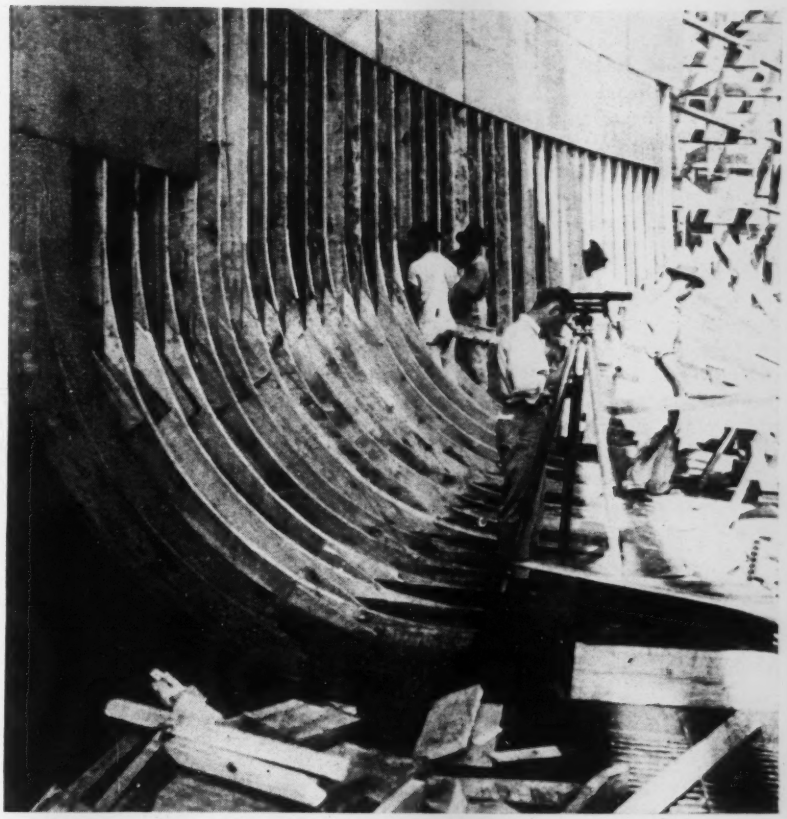

Fig. 2. Timber ribs of outside form are covered with ⅝-in. plywood. At the bilge a series of sawcuts in the reverse side of the plywood permit bending.

Trucks and tractor-drawn sleds or wagons are used for on-the-job transportation. A tower hoist and several small stiff-leg derricks are set up along each of the hulls for material handling; concrete placing utilizes two additional tower hoists for raising the concrete to the deck.

The exterior forms of the ships are supported on preassembled timber bents located at the 10-ft. 8-in. spacing of the frame of the finished vessel. These bents rest on the footings, and are arranged to support plywood forms a few inches in front of the frame itself permitting exact alignment of the concrete face. Double 2x6's are used for wales with 2x8-in.

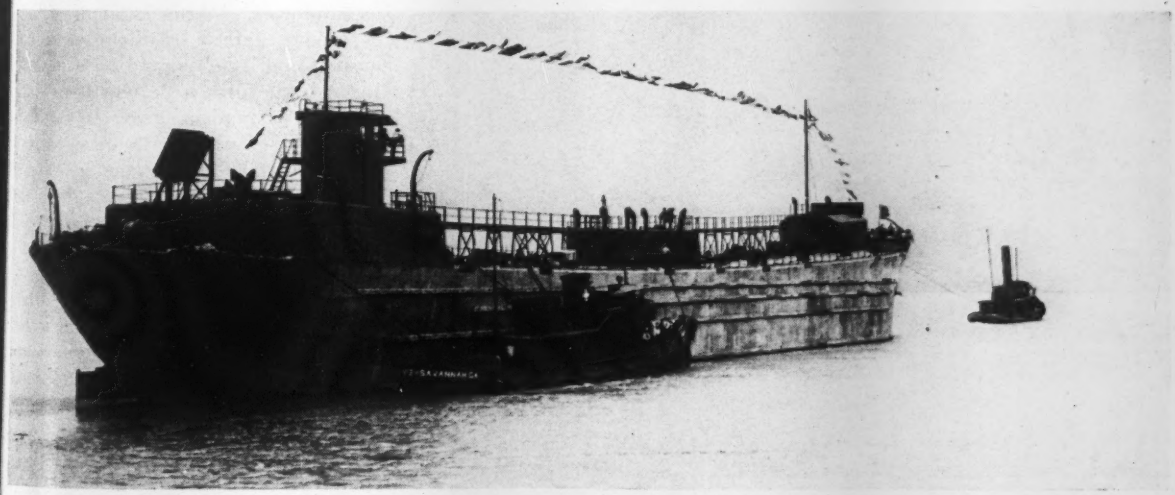

Fig. 3. Barges are shaped to the ship lines of good marine architecture and have machinery for steering and towing. This is Concrete 6, first of these ships to be launched on the East Coast in World War II.

vertical studs at 16-in. centers supporting $\frac{5}{8}$-in. thick concrete-form grade plywood. Bents supporting the form are arranged so they can be moved back horizontally to permit stripping without dismantling.

At the turn of the bilge, and at other short radius bends in the form, two thicknesses of $\frac{3}{16}$-in. plywood were used for the first hulls but experiment showed that the 5-ply, $\frac{5}{8}$-in. plywood with a series of shallow saw cuts into the reverse side of the sheet permits bending to the radii required. For warped surfaces cuts are made in two directions, sometimes through three plies of the wood and even into the fourth.

Reinforcing steel is a major part of concrete ship construction with all longitudinal bars in the ship's bottom and deck welded continuous. Procedure followed is to butt-weld the longitudinal bars at a machine set up outside the hull and pull the bars into the ship through a trough made of steel sheet piling. Original plans for the barges did not require that reinforcing be welded and specifications permitted the use of re-rolled steel for reinforcing. Subsequently, it was decided that all longitudinal reinforcing in the ship bottom and deck would be butt welded.

Meanwhile, the reinforcing steel for this project had been allocated to a mill that was rolling a high-carbon steel for shells, the reinforcing to be made from reclaimed and rerolled materials. It was found that the hard-grade steel supplied required preheating of the bar ends; ten minutes for the weld; and subsequent annealing to prevent breaks adjacent to the welded joints. Mild steel requires less than $1\frac{1}{2}$ min. per weld to handle with no preheating or annealing required.

Reinforcing is assembled in place in the hull with the bars tied and then welded for rigidity and the bars supported on small blocks of precast concrete to keep them spaced from the surface. Exterior cover is $\frac{3}{4}$ in. at sides and deck and $\frac{7}{8}$ in. at the bottom; interior tolerance is $\frac{1}{2}$ in., making it absolutely essential that steel and forms be accurately positioned and securely held during concrete placing.

On the first few hulls built the reinforcing steel foreman was allowed to develop individual methods and ideas for the efficient placing of the steel. The cost of each method was carefully kept and the competition thus developed produced workable ideas for shortcuts and speed.

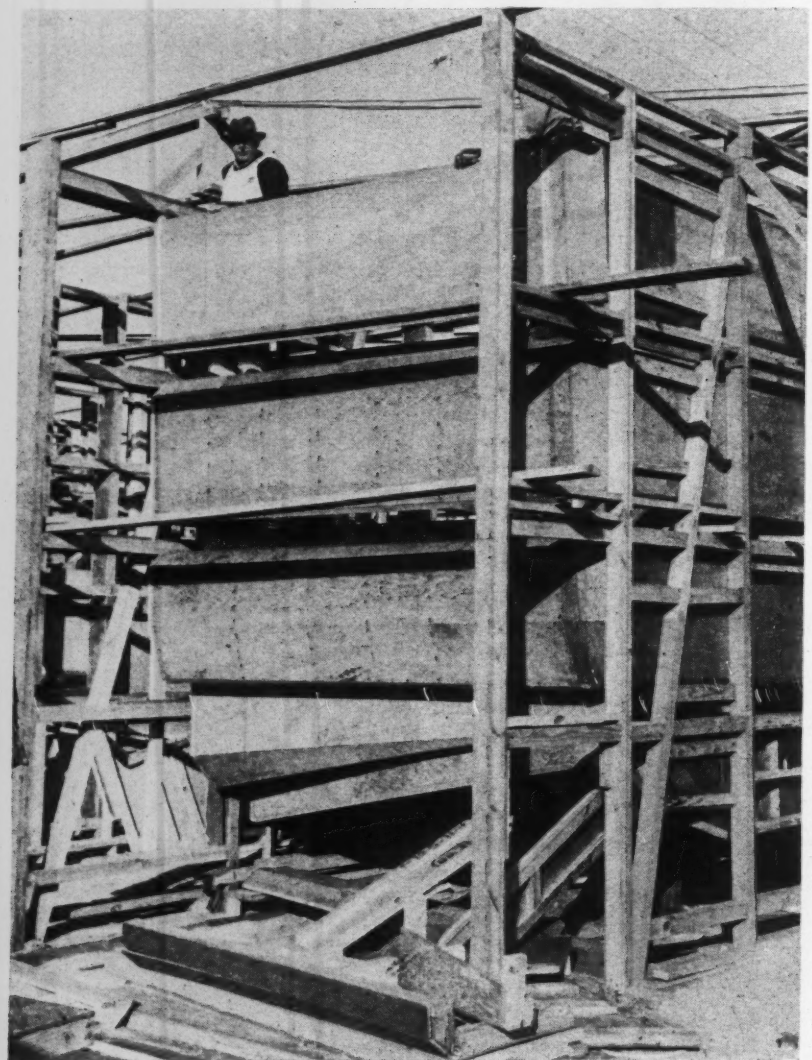

Fig. 4. Forms for the interior of the ship are built on a "mock-up" frame laid out to the exact lines of the ship.

Forms built on "mock-up"

While exterior forms and reinforcing were being placed interior forms were preassembled at a job shop. Originally such forms were made direct from plans for the ship but a more economical method was devised of building on a "mock-up" frame, a wood structure in the carpenter yard on which the exterior lines and the interior framing of the ship are laid out. The forms are built accurately to fit one location and they are marked carefully for transfer to this place in the hull.

Plywood, backed with convenient sizes of lumber, is used for the interior forms. Taking advantage of experience gained on the first hull, no plywood is now sawed on a bevel. Instead, the form is designed so that a piece of lumber, generally 2 in. thick, is used wherever a bevel is required. Usually this occurs at every intersection or corner of the frames and bulkheads.

Forms for the interior and the staging for concrete placing are supported on wood posts that rest on the steel on the bottom of the ship. Preassembled sections are brought to the hulls in the largest units that can be placed conveniently. Generally these are pieces about 4x10 ft. to fit between beams and frames of the midship section and are the maximum size that can be handled manually. However, at stem and stern sections

of the ship the converging reinforcing pattern and small work space available make form placing a slow and tedious process of re-matching the small sections of forms pre-made for the exact position they will occupy in the finished hull.

Thrust of the forms is taken by what are known as snap-ties, a 6,000-lb. single cold-drawn wire pulled up tight with a wedge. A combination tie and spacer with a coil welded into its end to take a rapid acting screw thread is being adopted for most of the future work. All of the ties are placed in the beams, where the concrete is 18 in. thick, rather than through the thin sections of the wall where leakage might follow the metal through the concrete. For special forms and for locations where ties of a predetermined length cannot be used, a cut-to-measurement rod is substituted over which is turned another rod with an inside thread and with its outer end provided with a rapid acting screw thread.

Hard-burned clay aggregate

Weight of the hull is kept low by the use of lightweight aggregate for the concrete. The coarse aggregate is a maximum size $\frac{3}{8}$-in. crushed clinker of hard-burned clay or shale and weighs about 37 lb. per cu. ft. Fine aggregate of the same type weighs 42 lb. per cu. ft. but it is necessary to add about 15 percent of natural silica sand to secure a satisfactory mix. About $9\frac{1}{4}$ bags of modified or Type 2 portland cement is used per cubic yard of concrete.

A powdered admixture, in the proportion of $\frac{1}{2}$ lb. per bag of cement, is added to the concrete to improve its workability. This admixture helps to prevent the necessity of adding excess water in the mix and retards setting of the concrete sufficiently that it can be satisfactorily worked from one to two hours after placing.

The stockpiles of lightweight aggregate are kept continuously wet as the porous materials, when dry, will absorb about 25 percent of their weight of water. About $5\frac{1}{4}$ gal. of water per sack of cement is added to saturated surface dry aggregates to produce a slump of 5 to 6 in. The minimum permissible compressive strength of standard 6x12-in. test cylinders is 5,000 psi. at 28 days. The average strength obtained to date is 5,700 psi.

Concrete is batched at a central plant near the shipways into 3-cu. yd. high-discharge truck mixers. Batches are proportioned to yield $2\frac{1}{2}$ cu. yd. and a 4-min. minimum mixing time is specified. Slump, flow, unit weight and temperature of concrete and air are determined for one batch from each ten (25 cu. yd.). Test cylinders in groups of five are made at each 100 batches or 250 cu. yd. One cylinder is broken at the age of 7, 60 and 365 days and two are broken at 28 days.

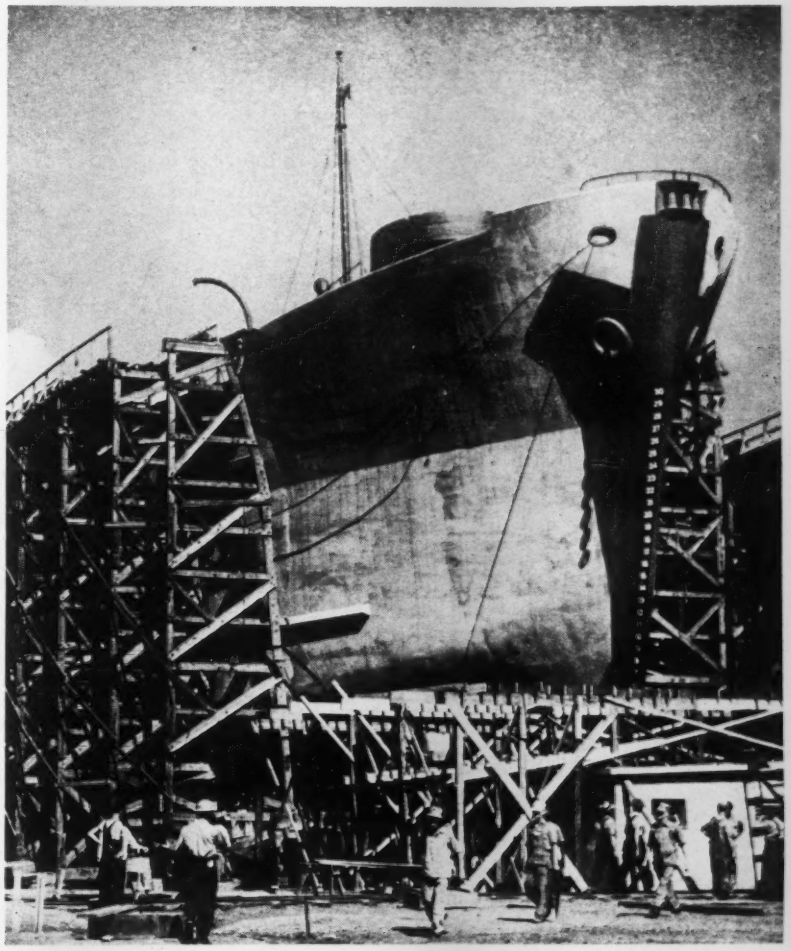

Fig. 5. Concrete barge nearly ready for launching. Bow shows outline of steel plate used at stem, this and stern-post being principal plate required.

On the first hull poured the concrete was raised to the deck by crawler cranes operating in the area between the shipways. On subsequent hulls tower hoists were employed with automatic-dump skips raising the $2\frac{1}{2}$-cu. yd. batch in two-skip loads. Concrete is dumped from the skip to portable buggy loading hoppers and moved to any desired point on the deck in concrete buggies.

A crew is assigned to place concrete in each of 29 separate compartments in the hull. Buggies deliver to a small receiving hopper on the deck, below which is a 6-in. dia. elephant-trunk spout to an open wood box in the hull. From this box, concrete is shoveled into coal scuttles and heavy scoops of steel, designed for this particular use, to enable workmen to place the concrete by hand exactly where it is wanted. The average crew in each of the 29 compartments is six laborers, a carpenter, a finisher and a foreman.

Both internal and external vibrators are used to assure that the concrete will flow to all parts of the form despite the closely placed reinforcing steel. Internal vibrators used are the flexible shaft, small head type. The vibrator head is placed on and between the bars and vibration continued until the concrete completely fills the form. External vibrators are clamped on the outside of the form

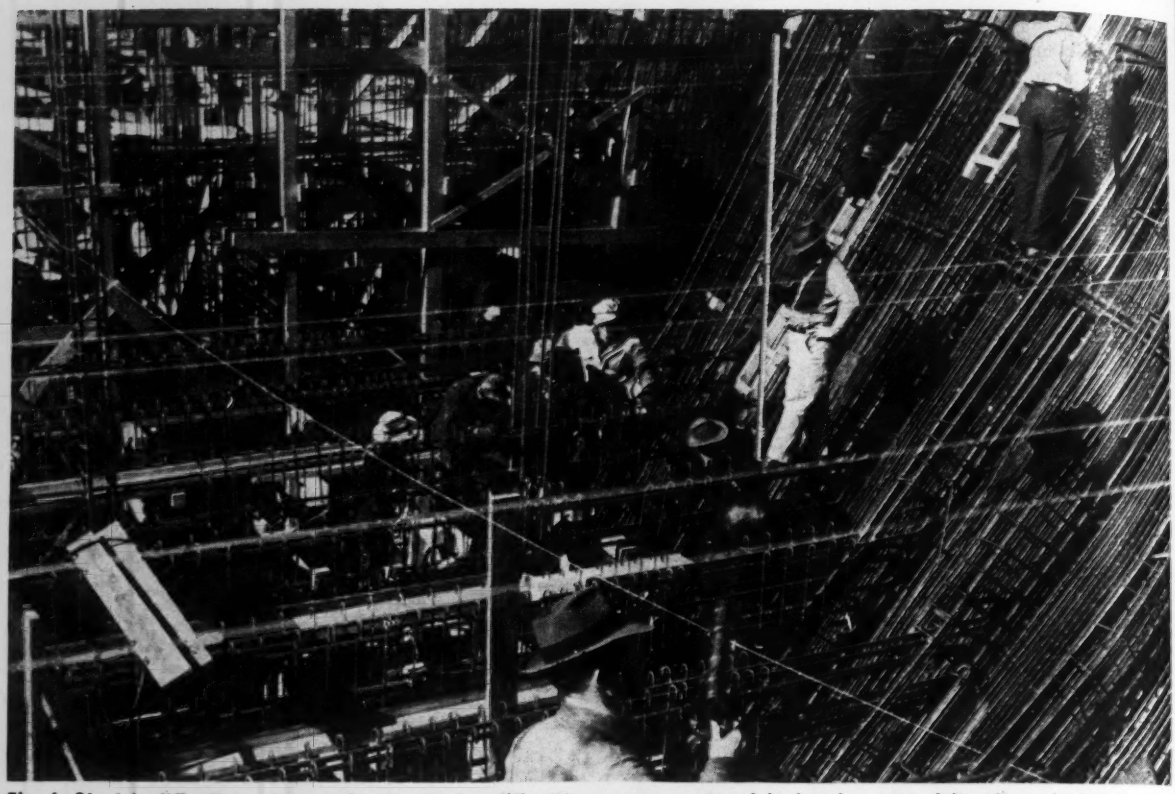

Fig. 6. Steel is difficult to place and even greater difficulties are encountered in forming around it, after placing, for the converging stem and stern framing of concrete ships.

and used to shake the form to assure solidification of the concrete.

Concrete in the bottom of the ship is placed without a top form but as soon as the finishing is complete a plywood cover is placed over it to prevent splattered concrete or falling material from marring the surface. The same procedure is followed with beam tops.

Experimental blocks placed prior to actual construction in the hull indicated that the concrete could be made to flow through the 4 ft. vertical height between beams. However, on the first hulls to be built the vertical walls of the ship are placed by pouring concrete into the top of the beam and at intermediate points between beam levels where a section of the wood form is left open for the purpose. The section of the form cut out to facilitate placing was tacked alongside the opening to be ready for replacing, a funnel of plywood being used to direct the concrete into the opening.

Supervisors check to see that the level of the concrete in all of the 29 compartments rises at a uniform rate. A "flag" of plywood painted red and yellow is used at the small hopper above each of the compartments to signal when a buggy of concrete should be dumped into that area. The flag is arranged on a nail through the center of its staff so that a pull from below on a messenger wire brings the flag into upright position signifying that a batch of concrete is desired. Concreting averages 25-30 cu. yd. per hr. requiring about 3 days of continuous pouring for one hull up to the deck line. Crews work continually in 12-hr. shifts, during this period.

The forms, in fact the entire framework, are constantly checked with instruments to detect any movement that may take place during the concrete placing. Lines are stretched around the outside of the ship and carpenters constantly watch these for evidence of movement. When movement is noted, steps are taken to correct it before it becomes great enough to be seriously harmful or the concrete hardens to an extent that no changes can be made.

The rate of pouring is checked by "bleeder holes" drilled through the plywood. As the concrete rises and starts to flow through the holes, the holes are plugged with corks. Caulking is necessary between some of the plywood sheets to assure a watertight form.

After placing, the concrete is cured by keeping it wet with sprays or damp blankets on the exterior. After the curing period the forms are completely stripped on the ways, provision being made under the hulls to gradually transfer the load from one set of supports to another. Supports are placed always under the frame of the ship rather than under the thin shell.

Methods used for concrete placing give a generally satisfactory concrete surface with only a small part of the 350,000 sq. ft. of surface area of a ship showing honeycomb or need of repair when stripped. In places where honeycomb or other imperfections are apparent, the defect is remedied in advance of any testing for watertightness.

Repairs usually are made by cutting through the slab, leaving all of the reinforcing steel in place, and repouring with the same concrete mix treated with a non-shrinking compound. The patched area is kept continually wet for some time before placing and special precautions are

aken to thoroughly pack the concrete olidly into place around all of the ars and the adjacent older concrete. ittle difficulty has been experienced getting watertight joints at such atches.

The hulls are tested for watertight- ess by applying a hydrostatic head f about 46 ft. of water to the bottom f the hull (2,880 lb. per sq. ft.) and esser pressures at higher points of he side shell. This pressure is ob- ained by the simple method of filling he individual compartments and ex- ending a small pipe above the deck o a height of 8 ft., thus adding the eight of the extra column of water o that in the hull.

Support is allowed only under the utside edges of the tanks under test, long the bilge and longitudinal and ransverse bulkhead lines; 750 tons f water is in each 18x32x37-ft. tank, t the time of the test. Deflection un- er such loading shows up any de- ects and perhaps open minute chan- els through the slab. It is sometimes found that the imperfection inside may be several inches from the point f appearance outside, caused per- haps by a little sawdust or other for- ign material or by uneven drying of he concrete.

The leakage lines are shown by moisture on the outside of the hull and are accurately marked for repair after water is removed from the tanks. Such imperfections are remedied by drilling holes to the steel along the crack lines, both inside and out, and forcing cement grout into the area with an impact grout gun.

Unfortunately, not all of the cracks show up on the first test. It is neces- sary to fill the individual tanks with water, test, and mark imperfections, then pump out for repairs. Testing requires many hours as it is necessary to pump water into and out of the tanks.

Meanwhile, loads in nearby tanks have been shifted and when water is again put into the tanks the stresses may be quite different, opening up other minute water passages. It is necessary to plug these, continuing the process until no indication of leakage can be found. Some hairline cracks, indicated by "sweat" marks on the hull, disappear if the tank is kept full of water for a few days, but normally time cannot be allowed for this gradual process as it is uncertain which, if any, of the cracks will close up. Testing and remedy of minor leakage is much more time consuming than repair of the obvious defects of the concrete. Several weeks of unre- mitting effort have been required to repair a barge after it was otherwise ready for launching.

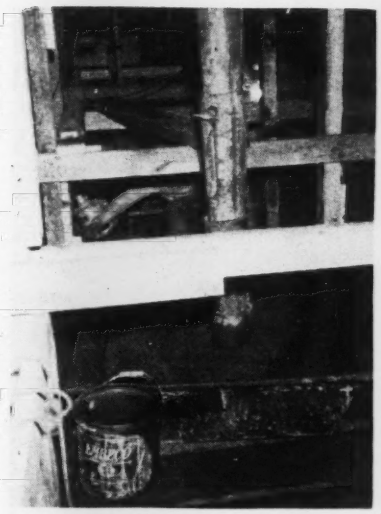

Fig. 7. Concrete is dropped through an elephant-truck spout to a box at the working level and distributed by hand to the forms. No appreciable segregation occurs.

The interior surfaces of the oil compartments are treated with three coats of a special paint designed to protect the concrete from oil. The ex- terior of the ships, to the light-weight water line are given a coat of paint intended to neutralize the free lime and seal the pores of the concrete fol- lowed by two coats of low visibility gray. Below the water line one coat of anti-fouling solution was to be used but it has been decided to experiment with these hulls, omitting painting below the water.

Personnel

The barges are built to the general specifications and directives of the U. S. Maritime Commission with all design and construction approved by the American Bureau of Shipping. The naval architectural plans and hull machinery designs were originally made by Manley St. Denis of Wash- ington, D. C., and later by Kindlund & Drake of New York City. The rein- forced-concrete design of the barges has been done by J. DiStasio & Co., consulting engineers of New York City, subject to the approval of the Maritime Commission. The DiStasio organization also did the design of the shipways, blocking, and forms.

The MacEvoy Shipbuilding Corp. is building 23 barges at Savannah un- der the supervision of Clifford F. MacEvoy, president, Warren Mac- Evoy, general superintendent and Robert I. Geyer, concrete technician.

The approval of all design plans is under the direction of R. D. Karr, chief of concrete construction section and James L. Bates, director of the technical division of the Maritime Commission, Washington, D. C. The work is carried on under the super- vision of J. F. McInnis, regional di- rector, and J. P. Sartz, coordinator of hulls of the U. S. Maritime Regional Office at Philadelphia, and J. M. Brown, principal hull inspector at Savannah.

Malaria Control and Water Supply in Honduras

What Honduran and United States engineers have described as the first inter-American health and sanitation project in Central America to com- bine water supply and malaria con- trol, is getting under way at Amapala, sole Pacific port of Honduras.

Amapala is a town of 2,000, at the foot of a mountainous little island, in the Gulf of Fonseca, about a mile from the mainland from which it is separated by shoal waters.

The inter-American project at Am- apala involves the clearing of thick vegetation from a lagoon adjacent to the town. The lagoon covers approx- imately 21 acres, and some years ago provided a natural reservoir of rain and groundwater, which was pumped to a nearby water plant that served the town.

In time the lagoon became choked up with a thick vegetable growth which discolored the water. The water plant fell into disuse and the lagoon became the breeding place for malaria-carrying mosquitoes.

Workmen are clearing the lagoon of vegetable matter and returning it to its original condition. The sides of the lagoon are to be lined with stone. Engineers believe the malaria menace can be removed and the reservoir re- stored at the same time. Upon the conclusion of the work, the water plant will renew operations.

The project is in the hands of the Servicio Cooperative Interamericano de Salud Publica. This is the agency set up by the Honduran government last year to cooperate with the United States in health and sanitation work.

Bowstring Trusses Provide Sawtooth Roof

***Contents in Brief**—To enlarge an existing steel-frame manufacturing plant with a sawtooth roof, bowstring timber trusses of 44-ft. span were employed. Little more timber was required than for the conventional bowstring trusses of equal span used on the same job. The trusses were fabricated at a commercial plant and delivered to the job ready for erection.*

WHEN AN EXISTING steel-frame sawtooth factory in the Midwest had to be enlarged, timber bowstring trusses that made possible continuation of the general roof layout were used. Not only did the trusses save large quantities of steel, but they also p mitted rapid erection and made p sible a highly satisfactory framew for the extension. Also the trus were delivered in a short period a they required little more timber th ordinary bowstring trusses.

The new construction was requir to enlarge the space provided by t old buildings with transverse ba about 45 ft. wide and 20-ft. colu spacing in the longitudinal directio The addition for several hundred fe was four bays wide and only two ba wide for 600 ft. Three bays were have a sawtooth roof, but the fou was to be two-stories high to provi wash rooms above the manufacturi area. For this bay timber truss with parallel top and bottom chor were specified to support the seco floor and ordinary timber bowstri trusses for the roof framing. In a 65 conventional bowstring truss were needed, an equal number parallel top and bottom chords, an 139 bowstrings with added membe to provide a sawtooth framing. Th spans varied from 43 to 47 ft. an averaged 44 ft.

With the ordinary bowstring which have a 7 ft. rise, the botto chords consist of two 3x8-in. fir ti bers, the web of single 3x4-in. yello pine pieces, and the upper chord twelve 2x3-in. yellow pine timbers glued-laminated construction, six ti bers being used each side of the we For the joints of maximum stres split-ring connectors were used. Th trusses with the sawtooth framing a tached were of very similar constru tion, except that the web member were 3x6's. To provide the sawtoot framing three vertical members an one diagonal were extended and t these were bolted two 3x8-in. yello pine timbers. To permit the installa tion of 8-ft. high windows in the roo valleys, two more diagonals were ex tended and to these, the chords, an the 3x8's just mentioned were bolte two 3x6-in. yellow pine members. Thus, very little additional lumber was required for the special bow string trusses.

All trusses were fabricated in Chi

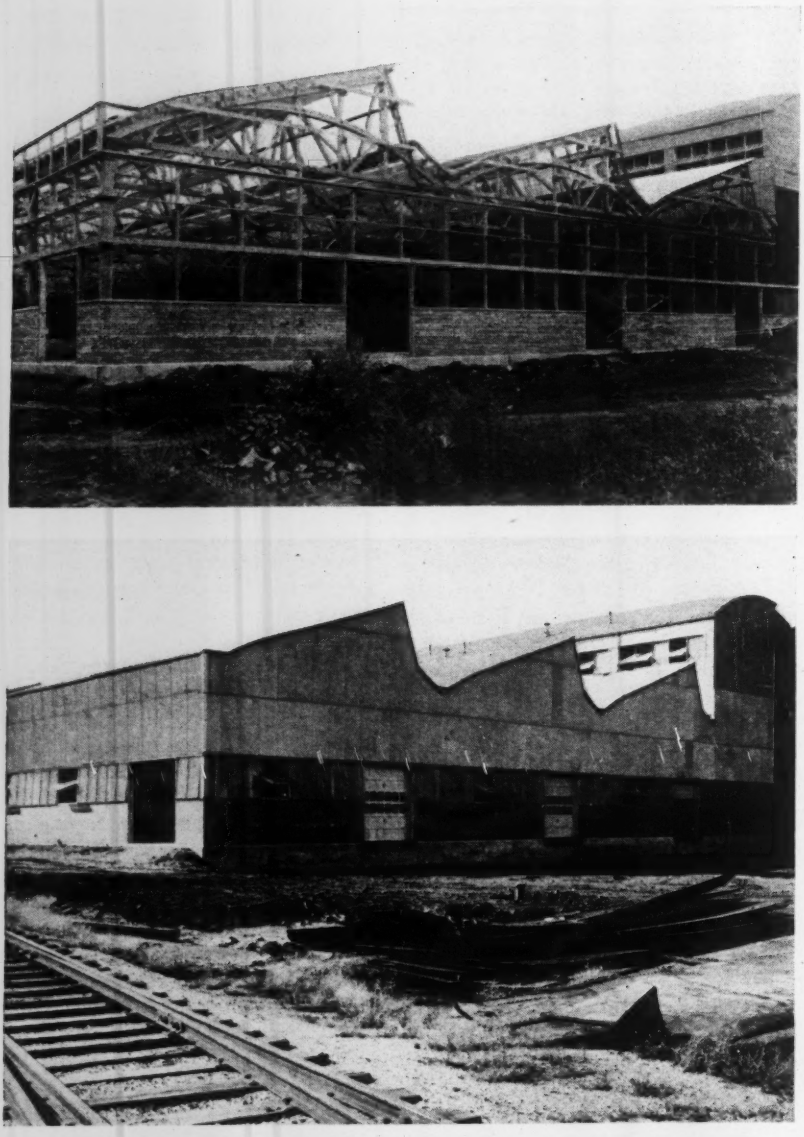

Fig. 1. Elevations before and after addition of windows and asbestos-cement sheathing. At extreme right is two-tory construction where ordinary timber bowstrings were used for the roof.

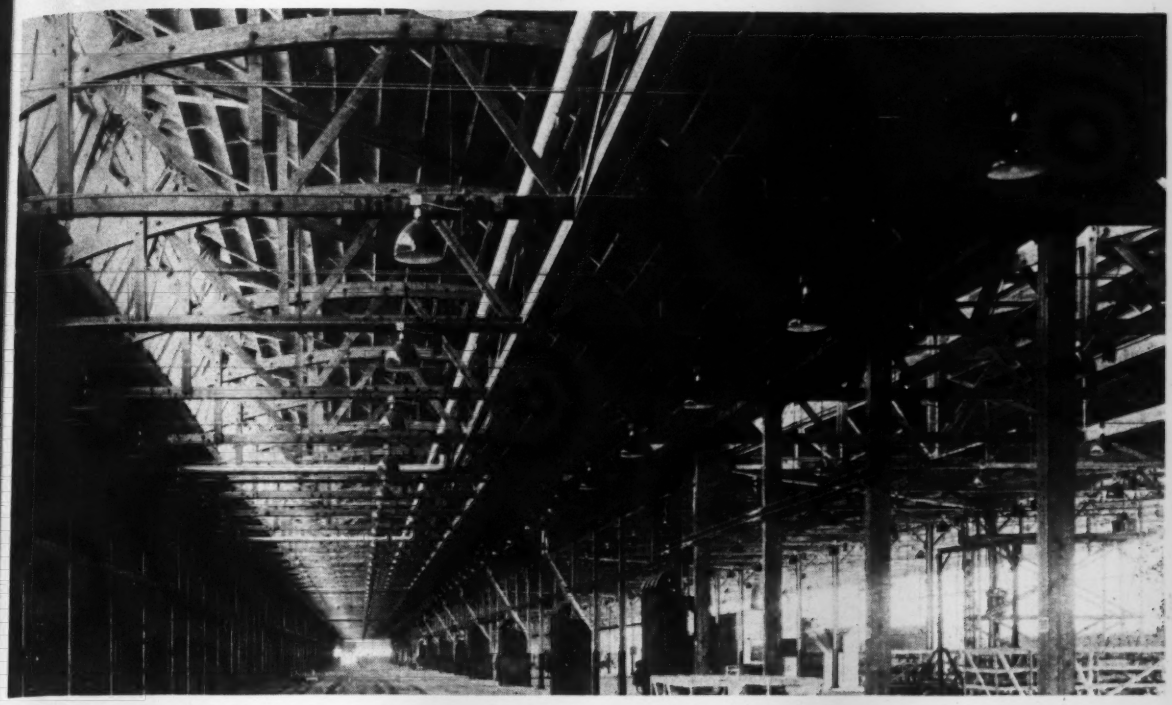

Fig. 2. Bowstring trusses permit addition of an 8-ft. high line of windows in each roof valley and thus good day lighting is provided at floor level. To carry piping shown and other conduits, trusses were designed for a live load of 25 lb. per sq. ft. of floor space.

cago and delivered to the job by railroad. They were erected by a 10-ton capacity crane with a 70-ft. boom. This same crane erected the timber columns, which were bolted to the steel shoes supported by non-reinforced concrete, continuous longitudinal footings. Where the new construction was one-story high, the columns were 12x12-in. fir timbers, but in the two-story construction the columns were 16x16's at the bottom and 8x8's for the upper story.

The only bracing between bowstring trusses is a T-strut, consisting of a 2x6-in. yellow pine timber spiked along one edge of a 2x12-in. member. This strut is located near the crown of the trusses.

The roof, which is designed for a snow load of 25 lb. per sq. ft., consists of 2x12-in. fir joists on a 2-ft. spacing, covered by a $\frac{3}{4}$-in. wallboard, and a 2-in. thickness of poured gypsum, a 2-ply built-up roofing, and gravel. A single line of bridging, made up of 1x6-in. members, is used in each bay between the joists.

Windows of corrugated wire glass

For the windows in the sawtooth roof, corrugated wire glass 8-ft. high is used. The upper section of the windows are mechanically operated to provide ventilation. To support the glass, longitudinal timbers are used between the trusses at the top, middle and bottom as shown by top view in Fig. 1.

Side-wall construction

Corrugated wire glass is also used in the side walls. For the lower 6 ft. the walls are of brick construction; the next 5 ft. of corrugated wire-glass, and corrugated asbestos-cement sheathing for the remaining height. When the sheathing had been added, the exposed inner surface of this material was covered with a $\frac{3}{4}$-in. layer of wallboard to provide added insulation.

The new addition is heated by blower units suspended from the trusses, which were designed for a live load of 25 lb. per sq. ft. to carry considerable piping and other conduits for the services required. For artificial lighting, 1,000-w. incandescent units on 20-ft. centers each way are used.

The work was done by the Corps of Engineers, U. S. Army. Because of military restrictions the location and names of those in charge cannot be given.

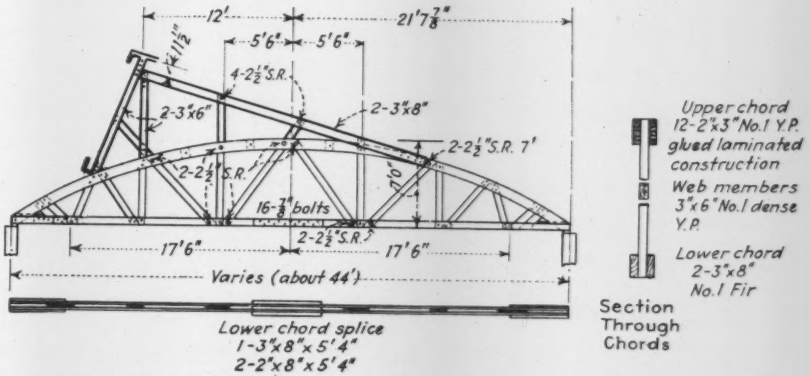

Fig. 3. Bowstring trusses to provide a sawtooth roof are very similar to conventional bowstrings required elsewhere on the job. Split ring connectors are used at joints where maximum forces are to be resisted.

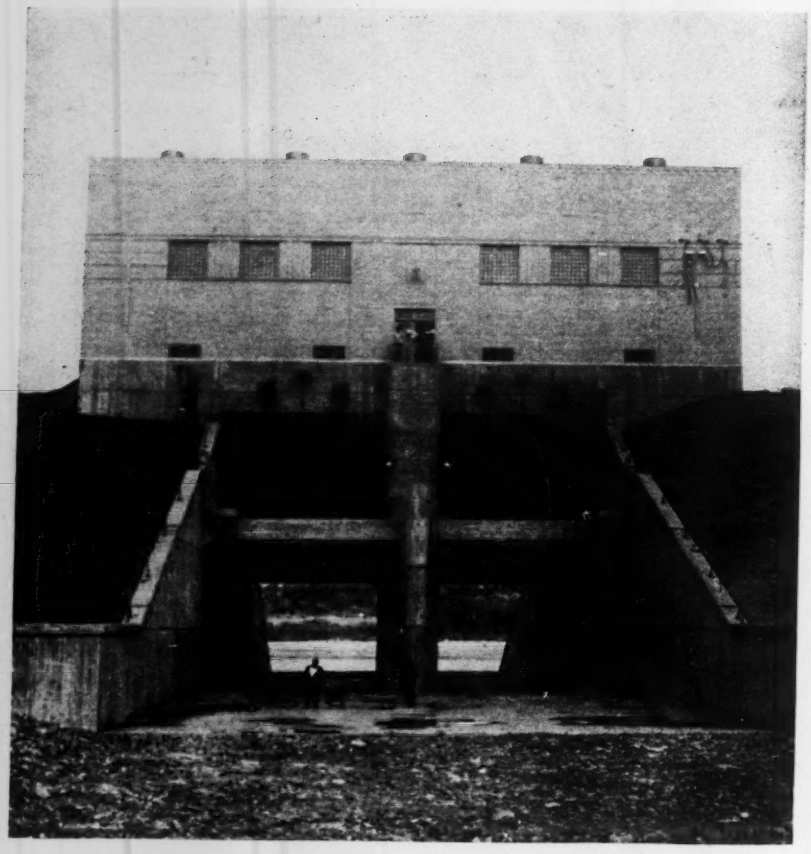

Fig. 1. Equipped with three pumps of 627,000-gpm. combined capacity, this station completes the major construction required to protect Huntington, W. Va., from floods on the Ohio River. Culvert through the structure is closed by steel gates now in the raised position.

A Pumping Station For Flood Protection

***Contents in Brief**—The final pumping station built to protect Huntington, W. Va., from Ohio River floods contains three pumps capable of handling 627,00 gpm. In the station's substructure is a reinforced-concrete culvert of 18,000-cfs. capacity to take care of local runoff within Huntington when the Ohio is at a low stage. The gates and trash screens of the culvert, which are located outside of the station, are raised and lowered by the traveling crane inside the station for servicing the pumps and motors.*

RECENTLY COMPLETED is a large pumping station that ends all major construction deemed necessary to protect the city of Huntington, W. Va., from Ohio River floods. This station is part of a $9,000,000 flood-control program that required construction of 4.5 mi. of earth dike, 7 mi. of reinforced-concrete floodwall, and sixteen smaller pumping stations to protect Huntington proper, including that part of the city known as Guyandot. In addition to its big pumps the new station is of interest because of the large flood gates required, the method of operating the gates and trash screens, and the construction procedure.

The main structure is 75x102 ft. in plan and 117 ft. high. The substructure is of reinforced concrete and the superstructure of steel-frame and brick-wall construction. The floors are reinforced concrete and the roof corrugated metal arched between steel beams and covered with sawdust concrete and a 4-ply tar and gravel roofing. Adjoining the main structure is a 123x50-ft. reinforced-concrete inlet channel and a 200x50-ft. reinforced-concrete outlet channel.

Located at the mouth of Fourpole Creek and know as the Fourpole Creek station, the structure is equipped with three propeller-type pumps to handle the runoff from 22 sq.mi. The pumps provide a combined capacty of 627,000 gpm. when pumping against a 5.5-ft. head, 445,000 gpm. against the maximum head of 32.7 ft. and they have 61½-in. propellers and 84-in. dia. discharge lines. Each pump is directly coupled to a 1,750-hp., 327-rpm, 3-phase, 60-cycle, 4,000-v. vertical synchronous motor. The 42-ft. shaft for each pump is of 10½-in. dia., made in two lengths, and provided with three bearings. The entire weight of the rotating parts of the pump and motor, together with the hydraulic thrust on the propeller, is carried by the motor thrust bearing.

Of special interest is the natural gas unit heaters to maintain the interiors of the motors and switchboard at slightly above ambient temperature. This arrangement is to prevent condensation when the equipment is idle. An instrument board adjacent to each motor contains temperature indicators for the bearings of both motor and pump, an indicator for the motor winding temperature, and a bell signal alarm and signal lights to indicate excessive bearing and winding temperatures. The pump motors are stopped automatically when the maximum safe temperatures are reached.

Each motor starts on full line voltage controlled by an electrically operated oil circuit breaker of the vertical-lift, metal-clad, drawout type and rated at 15 kv., 600 a., and 100,000 kva. interrupting capacity. The incoming 4,000-v. line is controlled by a 1,200-a. oil circuit breaker, otherwise similar to the motor circuit breakers. Air circuit breakers of the drawout type control the motors and generators of the exciter sets. All

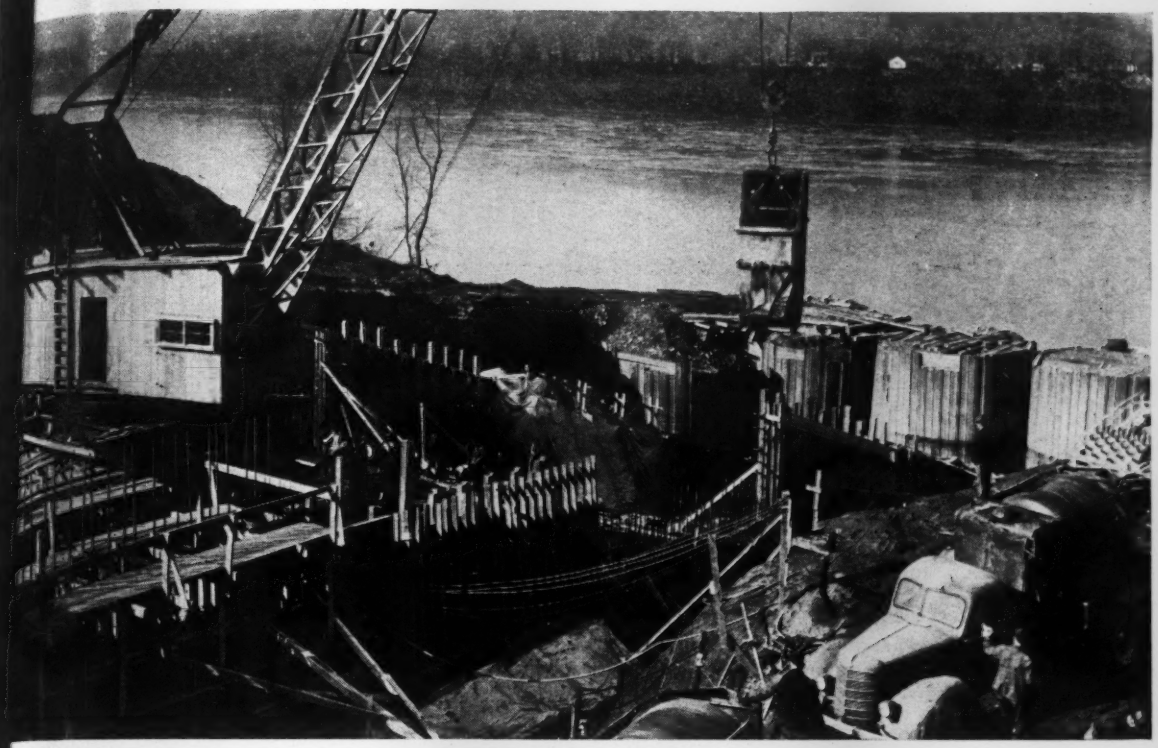

Fig. 2. River end of the culvert was constructed on shale behind a cellular cofferdam. The revolving crane, here placing concrete with a handy end-dump bucket, was previously used to remove the overburden with a clamshell bucket.

witching equipment is of the dead-ront type, and fully enclosed within ree-standing steel cubicles.

The pumps will go into operation hen the river stage is 40 ft. or El. 30. Starting and stopping of the nits will be by a manually operated ontrol. The water level in Fourpole reek will be kept at El. 530 as nearly s possible by pumping during flood tages, although no damage will re-ult until the water level exceeds El. 40. This plan will permit 1,550 cre-ft. of storage upstream from the tation, between El. 530 and 540, hich equals 1.33 in. of rainfall over he drainage area. This storage ma-erially reduces the pumping capacity equired.

Station to operate twice yearly

Based on the needs in an average ear, the station will operate twice nnually and remain in an operating tatus for 250 hr. yearly. However, he average year will require only bout 40 hr. of actual pumping time or one unit. In this period one pump s expected to remove about 460,000,-000 gal. of water. Assuming there is o inflow into the Fourpole Creek pool, one unit in 4 hr. can lower the storage pool one foot.

The station is so constructed as to permit submerged discharge from the three pumps at all times, as shown by Fig. 8. The discharge lines are equipped with flap gates to prevent a reversal of flow. Also at the top of each discharge line there is an 18-in. manually operated valve to permit breaking the siphon in the line if necessary.

During periods of heavy flow on Fourpole Creek and normal stage on the Ohio River, flow from the creek will pass through a reinforced-con-

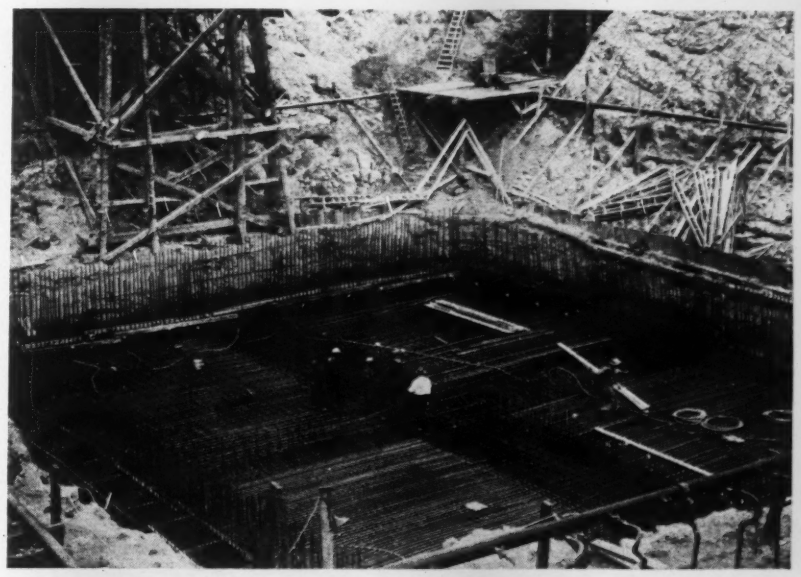

Fig. 3. Steel in place for the bottom of the reinforced-concrete box built as the substructure for the central part of the station. Trouble from foundation water was overcome by the wellpoints completely surrounding site and by a sheet pile wall about 10 ft. inside the wellpoints.

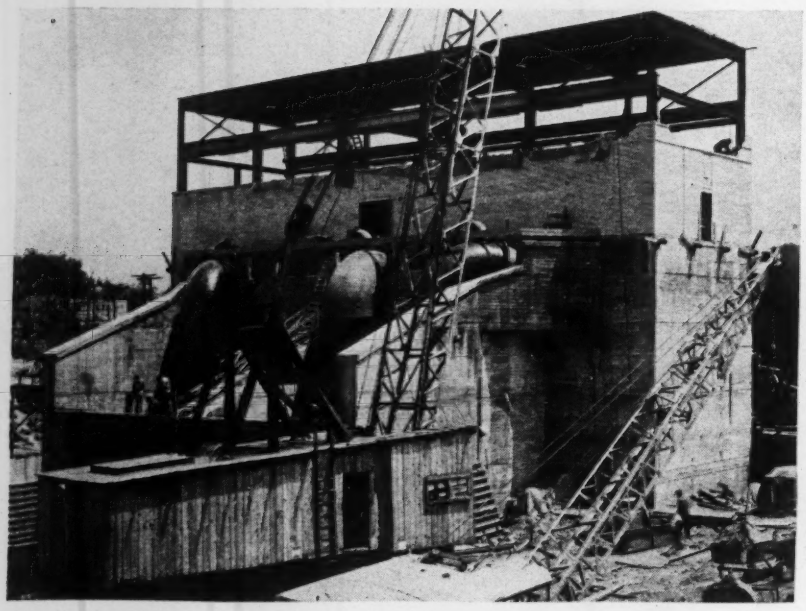

Fig. 4. River-side view of pumping station under construction shows discharge lines for three pumps in place and the wall, below workmen at left, that assures submerged discharge at low river stages.

Fig. 5. Close-up of a discharge line cluding flop gate that prevent reve of flow.

crete double-box culvert in the station's substructure. This culvert has an 18,000-cfs. capacity when the Ohio is not in flood and the stage of Fourpole Creek is at El. 540, or 7 ft. above the roof of the culvert.

Each box of the culvert is 25-ft. wide and 18-ft. high, and the boxes may be closed by partially-counterbalanced vertical steel gates each weighing 30 tons. The gates can be raised with the water 5 ft. higher on the upstream face than on the river side. They will remain lowered of course when the river stage is above that on Fourpole Creek.

Service crane raises gates

Operation of the gates is unusual. They are raised and lowered by a 20-ton capacity traveling crane planned primarily for use in servicing the pumps and various oth equipment in the station, althou the centerline of the gates is 11 downstream from the crane ho when at its rivermost position (F 8). However, with the pick-up-bea and rope transmission arrangem illustrated, the crane can raise t gates and by a lever and hanger s tem, secure them in the raised po tion, leaving the crane free for oth

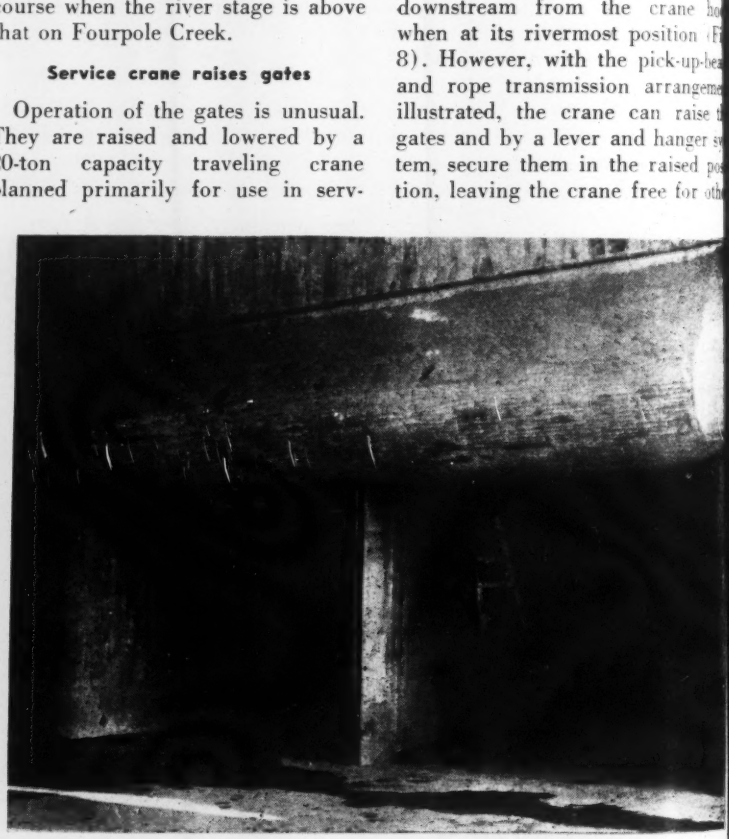

Fig. 6. A workman (left) stands below the middle intake. At right is intake to one of the two pumps that are recesse into the side walls of the culvert.

ties. By a similar arrangement the ne can be used to handle the trash ens, although the centerline of e units is about 8 ft. upstream n the nearest position of the crane k.

Construction procedure

Construction started July, 1941, major problem being the founda- work. Plans and specifications emplated constructing the lower ft. of the substructure as a caisson the balance by open cut. How- r, the contractor elected to exca- e by open cut for the full depth of substructure. The central portion the station is located on shale and required excavation to 82 ft. below 1937 highwater level. Removal 45 ft. of overburden was neces- y, and excavation for the first veral feet was accomplished with- t trouble from water.

When water trouble did start, a w of wellpoints were driven to com- letely encircle the foundation. By mping out the points it was pos- ble to continue excavating for sev- al more feet. When the wellpoints iled to keep the site dry, a continu- us steel sheet pile wall was con- ructed about 10 ft. inside the ell points. Once this piling, which as driven to bed rock, was in place, xcavation was completed with little ouble. The overburden was re- oved by a clamshell bucket handled an old 30-ton, steam-driven re- olving crane converted into an elec- ic unit with a 100-hp. motor.

The river end of the spillway also as located on shale and this con- ruction was protected on the river ide by a steel cellular cofferdam. Excavation was done by a clamshell ucket handled by a 15-ton crawler rane with an 85-ft. boom. The two anes also did the excavation for e remainder of the spillway and the pproach channel. This construction as founded on good soil over- ing the bedrock.

Cranes place concrete

The two pieces of equipment just entioned were used to place the con- ete, which was delivered to the job truck mixers. To make placing asier 1-yd. buckets of the type illus- ated by an accompanying photo- raph were used. Of interest is the act that when metal elephant trunks ould not be obtained to aid in dis- ributing the concrete, satisfactory chutes were made from canvas tubes.

Also worthy of mention is the fact that the substructure extends about 35 ft. below the bottom of the culvert previously mentioned and that to reduce concrete requirements and yet add the necessary stability, the substructure was built as a cellular reinforced-concrete box and filled with clay and sand. Next, the bottom of the culvert, which forms the top of the cellular box, was added completing the most difficult foundation work. Little trouble from ground water occurred above this elevation.

The station, which cost $664,000, including equipment, was built by the Huntington District, U. S. Engineers, with Col. W. B. Higgins, as district engineer, and Karl C. Vogel, resident engineer. Fegles Construction Co., Minneapolis, Minn., with D. L. Conner, superintendent, was the general contractor. The pumps were manufactured by S. Morgan Smith Co., York, Pa., and the motors, motor-generator exciter sets and switchgear by Westinghouse Electric & Mfg. Co.

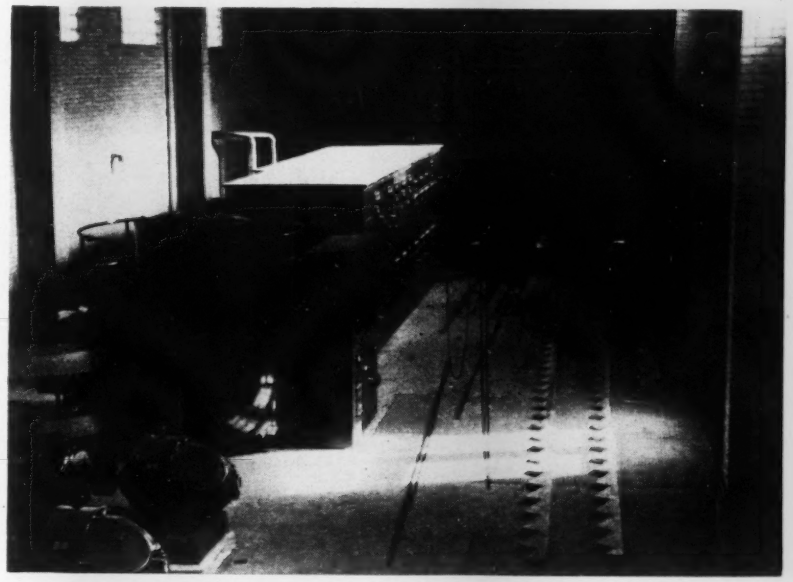

Fig. 7. Interior view of substructure. Electric motor for the middle pump is shown at left center. Two galvanized air ducts are shown leading to motor heat unit above ambient temperature, which prevents trouble from condensation. Electric control board also is shown.

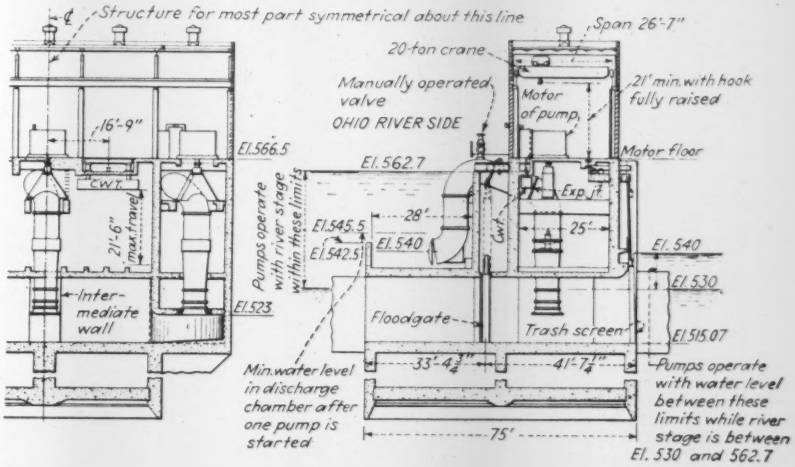

Fig. 8. As these cross-sections show, pump intake is built into the intermediate wall of the box culvert. Intakes for the other pumps are in recesses in the side walls. Transverse sections shows traveling crane that may be used to service motors and pumps and handle flood gates and trash screens.

German Dams Attacked Successfully

Joseph D. Lewin
Consulting Engineer, New York, N. Y.

***Contents in Brief**—Study of photographs of Moehne and Eder dams in Germany following the recent attack by units of the Royal Air Force indicates that the attack on each structure was highly successful and that most of the stored water in both reservoirs was lost. Loss of this water for power, industrial and navigation uses appears to be more serious than possible injury due to floods in the valley below.*

NINETEEN LANCASTER PLANES, each carrying seven men, and nine 1,500-lb. mines (or 12,000 lb. of high explosives) approached the Moehne and Eder dams in Western Germany on the night of May 16-17. Eight planes with 56 men were downed by the defending forces. The remaining 11 unloaded 65 tons of explosives and damaged the dams. The exact extent of damage is not known. Good photographs of Moehne Dam taken after the raid reveal a gap 250 ft. long and 42 ft. deep in the crest of the dam. A less clear photograph of Eder Dam shows a breach approximately 200 ft. long and of unknown depth. Such details of the attack as were available at the time were published in *Engineering News-Record* May 20, p. 719.

Both dams are located in Rothhaar Mountains, in the Ruhr district, one on each side of the watershed between the headwaters of Moehne-Ruhr-Rhine River basin and the Eder-Weser River basin. Over this watershed the average yearly rainfall is about 48 in., second highest in Germany. Both dams are curved gravity type structures forming reservoirs among the largest in Germany. The timing of attack with respect to the hydrologic cycle was perfect. As can be seen from the hydrograph (Fig. 5) of the Ruhr River, most of the excess rainfall occurs before the middle of May. In an average year the reservoirs are full by May 15; the attack occurred on May 17, indicating that the attacking forces knew when the reservoirs would be full, thus insuring the maximum damage downstream, also that water lost could not be replaced. Photographs of Moehne taken just in advance of the raid showed it to be full, as anticipated. A full reservoir also facilitated destruction of the dams because at such times the water pressure is at its maximum and the dam is at the maximum design stresses. Further, the thickness of the dam at any elevation below water level at which explosive charges may be set off is less than when the reservoir is only partly filled.

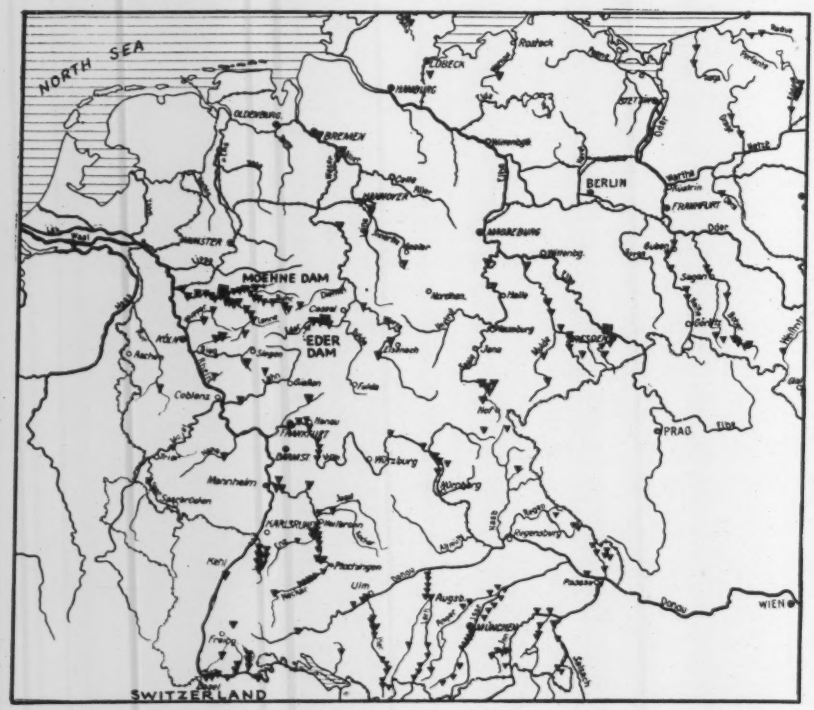

Fig. 1. The two dams attacked by British airmen are in the Ruhr district of western Germany, Moehne Dam being on a large tributary of the Ruhr River, and Eder Dam being on a tributary of the Weser River. Waterpower plants are indicated by black triangles and pumped-storage plants by rectangles.

Details of Moehne Dam

Moehne Dam, built in 1913 by the Ruhr Water Association, is 132 ft. high, a cyclopean rubble masonry structure, 2,132 ft. long at the crest with a base 112 ft. thick and 1,000 ft. long (Figs. 2 and 4). It is provided with considerable facing and a complete system of drain pipes, so that the main body of dam can be considered as dry masonry having no uplift forces. The 160-sq. mi. drainage area contributes annually 8,440,000,000 cu. ft. of runoff, of which 5,300,000,000 cu. ft. is retained in the reservoir to form the head storage for an extensive and integrated development of the Ruhr River basin. The reservoir has a usable capacity of 110,000 acre-ft. To comprehend its importance, visualize a TVA with Norris Dam as

headwork transplanted into the industrial region of Pittsburgh.

Moehne reservoir serves mainly for water supply, navigation and flood control. The power developed at the dam is insignificant, being only 8,800 hp. The plant was operated only four hours daily at time of peak load and produces annually 12,000,000 kwh. The head is 109.5 ft.

Immediately below the Moehne Dam is an equalizing basin with another power plant. This basin has 14,000,000 cu. ft. capacity (324 acre-ft.), which is sufficient to equalize the irregular outflow from Moehne Dam. The lower powerhouse operates at 18-ft. head and has a capacity of only 400 hp. The Ruhr Water Association (V.E.W.) has about 20 water power plants with 123,000 hp. total installation producing about 45,000,000 kwh. The steam power plants of the system, on the other hand, have an installed capacity of 325,000 hp. with an an-

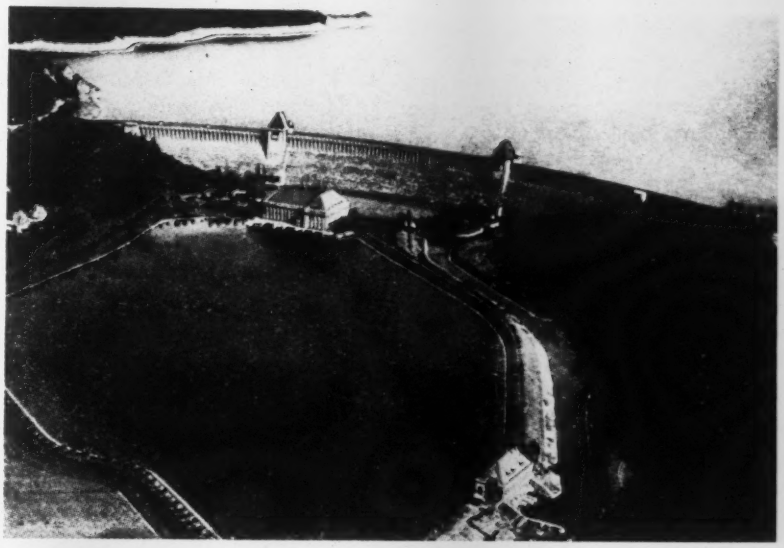

Fig. 2. Moehne Dam serves chiefly as a storage reservoir, forming a reservoir of 110,000 acre-ft. capacity. The small power station in front of the dam was used to carry peak loads, water discharged during the four hours of operation each day being stored in the basin below the dam for release at a more uniform rate through the powerhouse in the foreground. As will be seen in the picture immediately below, the dikes of this basin were largely swept away.

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Fig. 3. Airviews taken before and after the attack on Moehne Dam show clearly the extent to which it was damaged. Applying the recorded dimensions of the dam to the photograph indicates that the breach is 250 ft. wide and 42 ft. deep. The loss of stored water, which is vital to industrial plants and navigation facilities below, is clearly indicated. The main power station in front of the dam appears to be completely destroyed.

nual production of 600,000,000 kwh.

The equalizing basin was formed by a dike about 15-ft. high. Its spillway was wholly inadequate for the water discharged through the breach in the dam, hence the dike was overtopped and largely destroyed, as may be seen in Fig. 3.

A cross section of the dam is given in Fig. 4. Because of the importance of the dam, it was somewhat overdesigned. The resultant force falls well within the middle third of the base.

Scaled from the airview (Fig. 3) the breach made in the dam by the mines dropped from the attacking planes, the breach is 250 ft. long and 42 ft. deep. This masonry failure could occur due to two conditions: (a) Tension on upstream face; (b) Shear throughout the section. Taking into consideration the fact that the dam stood for 31 years, it is reasonable to assume an ultimate compressive strength of 2,500 psi. The ultimate tensile strength would be, according to C. Bach and O. Graf, about 1/12 f_c or 200 psi. Therefore a load of 1,100 kips per linear foot of dam had to be applied to produce this tension. Since the design width at this elevation is 38 ft., the unit shear is

$$\frac{1,100.000}{38 \times 144} = 201 \text{ psi.}$$

This means that the same force would produce critical stresses in shear and in tension. Therefore it might be assumed that about 1,000,000 lb. was applied per linear foot of dam. To produce such dynamic load at 25 ft. depth in water and at 20 ft. from the face of the dam, about 4,500 lb. of high explosive would be needed per 30 ft. of dam. For the entire dam 37,500 lb. would be needed.

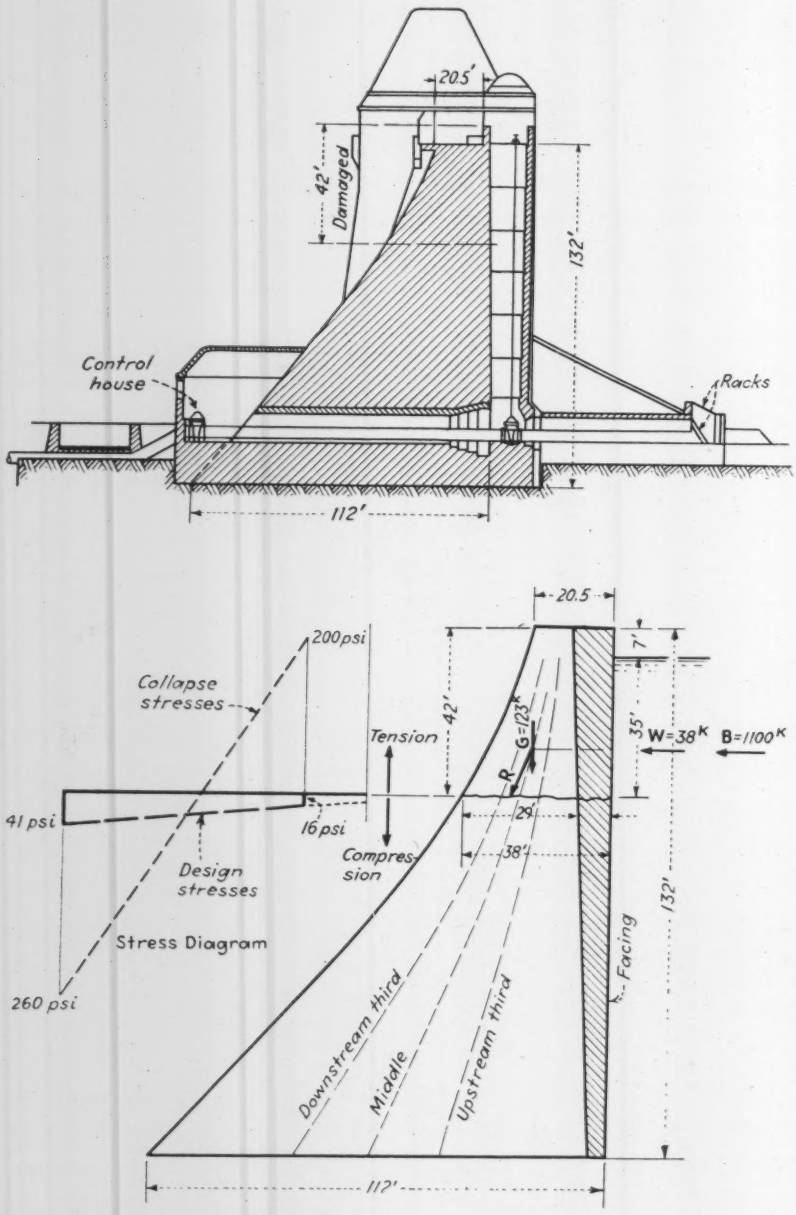


Fig. 4. The principal dimensions of Moehne Dam are shown in the upper drawing, which is based on one published in Germany before the war. In the lower diagram the probable forces acting on the dam during the attack are developed.

Accurate bombing

If the 1,500-lb mines dropped by the planes were of light-case type, they would contain about 1,350 lb. of explosives each. Since 11 planes with nine mines each are reported to have reached the targets, about 130,000 lb. of explosives were used on two dams, or 65,000 lb. per dam. The radius of rupture of each mine is about 40 ft. The fact that only 70 percent more mines were used than would be called for theoretically seems to indicate a very close and exact bombing.

It might be mentioned in this connection that underwater blast increases in efficiency with submergence until a depth is reached where the horizontal pressure reaches its optimum. Mines can be adjusted to detonate at such depths. If so equipped, the terminal velocity must be kept low, which necessitates bombing from exceedingly low altitude, like 50-70 ft., or use of parachute mines.

Much water lost

The breach in the dam resulted in loss of the greater part of the stored water. Assuming action of a broad-casted weir, the maximum discharge would be about 172,500 cfs. This discharge, occurring almost if not directly behind the powerhouse, completely destroyed that structure and the dikes of the impounding basin below.

Since the upper 35 ft. of reservoir impounds about 3,000,000,000 cu.ft. it took about 10 hours to discharge this volume at the estimated rate of 172,500 cfs. This 172,500-cfs. flood discharged into the Ruhr Valley, a narrow gorge of about 3,000 to 10,000 ft. wide. It certainly could not

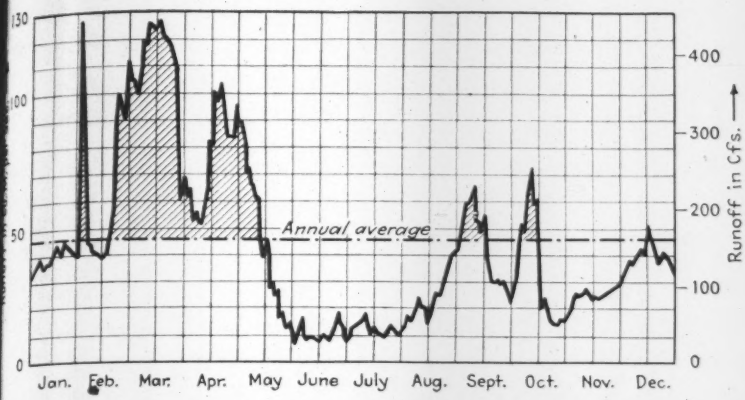


Fig. 5. This hydrograph for the Ruhr River shows that runoff available for storage will comes before the middle of May. An attack at that time, therefore, should have found the Moehne reservoir full. Conditions were similar at Eder Dam.

roduce a standing wave more than ft. high, and reports of seeing a idal wave shooting down the valley herefore seem exaggerated. If it is rue that the valley was flooded for 0 miles, (310,000 ft.), and assumg its average width even at 3,000 , about 1,000,000,000 sq.ft. would ave been covered. Since the total verflow was only 3,000,000,000 cu. , the average depth of flood was bout 3 ft. which could not be conidered devastating. Of course, on s way down, the flood doubtless amaged dikes, bridges, highways, nd power plants as the structures cross the channel were designed to ass a flood of only 12,000 cfs. Therefore, the damage due to interruption f traffic, transportation, communiation must have been considerable. lso important is the loss of stored water, which amount to one-third of a year's runoff. This will have its repercussions in shortage of water supply to more than 250 municipalities, several hydro plants and navigation along the Ruhr River, and Dortmund-Ems Canal.

The loss of water supply will also reduce the output of the Herdecke pumped-storage power plant which is 35 miles below Moehne Dam. Herdecke, one of the largest installations in Europe, is the key power plant for the entire Rhine-Westphalia industrial district as it supplies the peak load for the integrated power system. Without exaggeration, the loss of water and electric power will have a more prolonged effect on German industrial production than the loss of bridges or damage to roads.

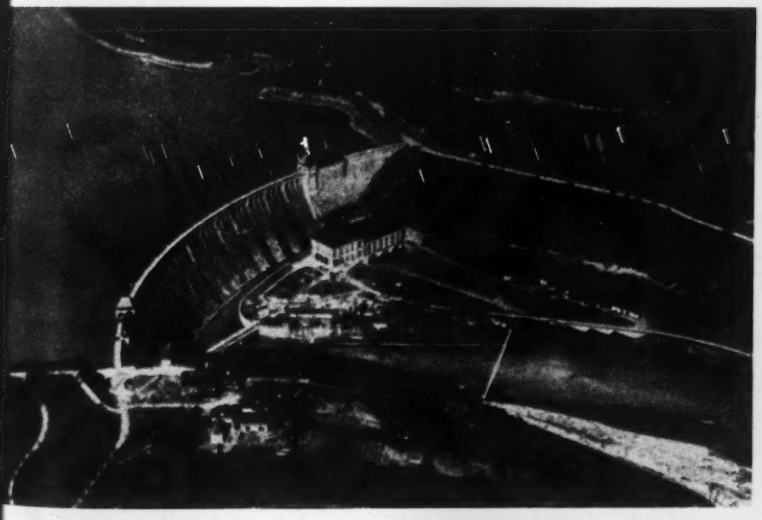
Newpapers reported that the mines were so placed that they penetrated into the sluice gates. This is questionable, as will be seen by examination of Fig. 4. The intake is very deep and is protected by two sets of racks.

[Examination of the airview of Moehne Dam shown in Fig. 3 leads us to conclude that Mr. Lewin is conservative in his estimate of the depth of the breach made in that structure. To us, the depth appears to be much greater.—EDITORS.]

Damage to Eder Dam

Eder Dam was built in 1914. It is a curved gravity concrete dam, (Figs. 6 and 7), 157 ft. high, 1,310 ft. long at the crest, and 885 ft. long at the base, which is 120 ft. thick. The crest is 19 ft. wide. The drainage area of 550 sq.mi. has a maximum runoff of 31,800 cfs. The spillway of the dam permits 5-ft. overflow for a length of 500 ft. It is augmented by six outlets on the right bank capable of passing 7,000 cfs, also by twelve controlled circular outlets, 8.5 ft. dia. which are located 47 ft. below the crest. The total storage capacity of the reservoir is 7,200,000,000 cu.ft. (164,000 acre-ft.), 5,400,000,000 of which is stored in the upper 35 ft.

Eder Dam feeds four power plants. On the left bank at the dam is Hemfurth I, a 6-unit, 21,100-hp. installation, operating at 131-ft. design head. A second plant, Hemfurth II was added in 1926, on the right bank. It contains three units of 8,000-hp. capacity at 115-ft. head. Both plants discharge into an equalizing basin 25 ft. deep, of 70,000,000 cu.ft. (1,600 acre-ft.) capacity, which is controlled by the Affoldern power plant, a 3,400-hp. installation operating at 30-ft. head. The basin is



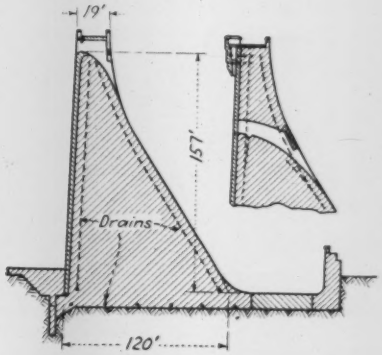


Fig. 6. Eder Dam was built in 1914. It is located at the headwaters of the Eder River, a principal tributary of the Ruhr. The dam is of concrete, 1,310 ft. long. A typical section is shown at the right. There are two power plants, one at each end of the dam, the one on the near side of the river being out of sight behind the hill in the foreground.

formed by an earth dike, 5 mi. long, with a weir at the lower end having a controlled discharge capacity of 32,000 cfs.

This equalizing basin serves also as the supply pool for the Bringhausen pumped-storage plant a 164,000 hp. installation, having four units operating at 1,000-ft. head.

Comparison of the photograph of Eder Dam taken after the dam had been breached with drawings of the dam indicates that the breach was about 180 ft. long and of such depth as to result in loss of most of the stored water. This would have produced a flood flow of around 125,000 cfs. for 25 hours.

Such an outrush of water most probably flooded the two power stations at the dam. It certainly must have overtopped and washed out the 5-mile long dike forming the equalizing basin below the dam. The control works and small power plant at the lower end of the basin presumably were lost or badly damaged. It may be assumed also that the pumped-storage power plant, located on the side of the equalizing basin, was flooded and badly damaged.

Large loss of power

The annual power production of this group of power stations was:

Hemfurth I & II	50,000,000 kwh.
Affoldern	12,000,000 kwh.
Bringhausen	150,000,000 kwh.
	212,000,000 kwh.

The output of these plants probably is stopped for a long time to come.

About 35 miles below Eder Dam lies Kassel, an industrial city of 200,000 and an important railroad center. Since the discharge from Eder Dam was larger than that from Moehne, and since the Eder valley is narrower, the damage to Kassel may have been very large. Furthermore, since Eder contributes to the operation of the Mittelland Canal, which is the main west-east artery in the internal navigation system of Germany, a serious interruption to the German transportation system must result.

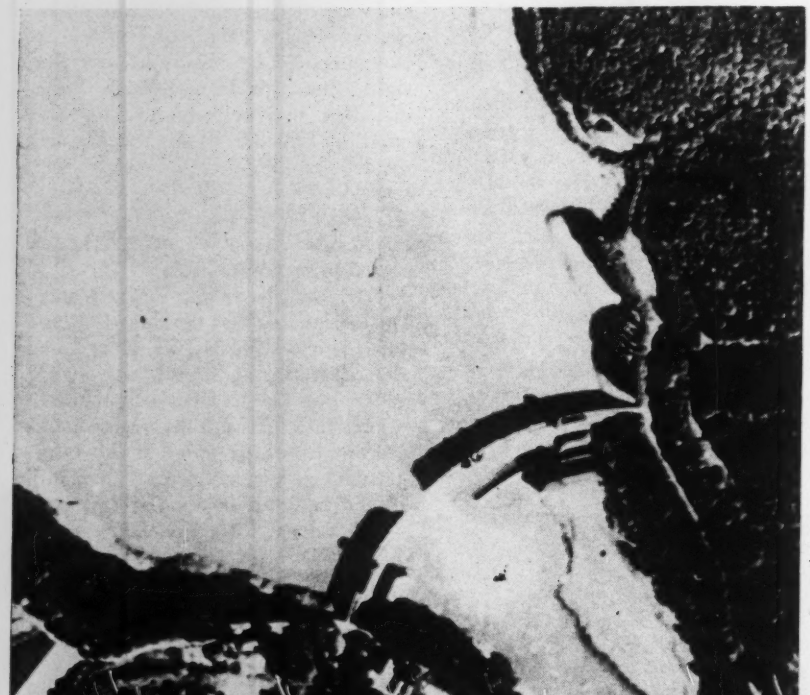


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Fig. 7. Eder Dam formed one of the largest storage reservoirs in Germany, its capacity being 164,000 acre-ft. Power stations were built below the dam at each side of the valley. The airview taken after the dam was attacked indicates that both escaped destruction but may have been severely damaged by flooding. It seems probable, however, that the power station at the lower end of the regulating basin below the dam was badly damaged if not lost.

Other dams subject to attack

Since the attack on Moehne and Eder dams, question has been raised as to why similar attacks should not be made on the many other dams in Germany. The answer probably is found in the fact that few of the dams are as vulnerable to attack as were these two structures.

German waterpower resources are located chiefly in four regions: (a) In the Alpine region along the tributaries to the Danube; (b) In the southern Black Forest on the upper Rhine (below Lake Constance) and its tributaries; (c) In the northern Black Forest along the Murg and Neckar rivers, tributaries of the Rhine; (d) In western Germany on the Ruhr and its tributaries.

The upper Rhine is regulated by Lake Constance, which has no outlet works, the lake being controlled by a natural rock sill. Power plants on the Rhine operate as run-of-river plants and are located at weirs which are provided with movable gates and locks, very similar to low dams on the Tennessee. Any damage from air attack would be insignificant, even considering the effect on navigation, and since the Rhine separates Germany and Switzerland, these plants are mutually owned by those two countries. Therefore, any damage to the plants might cause an international complication.

On the other hand, the Schluchsee pumped-storage plant of the Rhine system could be attacked without such complication. Its reservoir of 3,500,000,000-cu.ft. capacity is controlled by a 205-ft. curved gravity dam, 940 ft. long. Loss of this storage would greatly reduce the efficiency of the Rhine plants in Germany.

Another candidate for attack is Schwarzenback Dam in the northern Black Forest. It is 215 ft. high and 1,250 ft. long, with a reservoir of 2,500,000,000 cu.ft. capacity.

An English View on Contact Aeration

● Editor's Note—An article on the contact aeration method for sewage treatment by Llewellyn B. Griffith, vice president of the Hays Process Co., which appeared in the Jan. 28, 1943 issue of *Engineering News-Record* was reviewed in the April 30 issue of the British publication *The Surveyor*. That review was accompanied with comments by John Hurley, Member of the Royal Sanitary Institute and of the Institute of Sewage Purification. Mr. Hurley's views, which will be of interest to American sanitary engineers, follow.

To get the Hays process into true perspective, it may be helpful to review briefly the development of contact aeration and to note the opinions expressed concerning this method of sewage treatment.

The introduction of contact materials into sedimentation tanks to act as "colloiders" was tried by Travis and others many years ago. This was not a success, as septic action set in owing to lack of aeration. One way of achieving this was the alternate exposure and submergence of the contact material. However, it was found to be more convenient to obtain the necessary aeration by blowing compressed air upwards through the contact medium. This can be done either by fixed plate or tube diffusers, or by swinging tubular diffusers.

Discussing the nature of contact aerators, Imhoff describes them as "contact beds which are continuously submerged in the sewage they treat. In the list of true contact processes, they occupy a position intermediate between trickling filters and activated sludge units."

Previous experiences

Most of the previous work on contact aerators has been done in Germany and the United States. In both countries, plants of reasonable size have been constructed, but on the whole the reports on the performance of the process have not been enthusiastic. Particulars were given by Mahr and Sierp in 1928 of plants in Germany in which contact aerators were used for partial treatment. Supplying air at the rate of about 0.3 cu.ft. per gal. of sewage, the average purification effected was of the order of 40 percent, calculated on the "oxygen absorption from permanganate" or "biological oxygen demand" tests.

Thackwell made the following comments on the operation of a contact aeration plant at Jacksonville, Texas: "From my experience I should say that the value of contact aeration would only be one where partial treatment is desirable. As a forerunner of trickling filters, I should prefer a coarse-grained roughing filter, provided sufficient head were available. Straight activated sludge of twenty minutes aeration would be just as satisfactory for a preliminary treatment."

Economy questioned

The view that contact aerators are uneconomical for full purification is supported by Imhoff and Fair, on the grounds that they need to be of the same capacity as an activated sludge plant, and "the cost of the contact units is added to that of the tanks and aerating devices." They appear to regard this as more than sufficient to offset any possible saving in the cost of aeration and of returning sludge.

In the past, contact aeration has been found, like most other processes, to have its good and bad points. On the credit side are that it requires little head and can be designed to give almost any degree of purification. Also, when used for partial purification, it has an advantage over the activated sludge process in that a sludge reactivation plant is eliminated.

The main items on the debit side are high capital cost and troublesome and expensive maintenance. In addition to the cost of supplying air, the need for much attention for the removal of excess solids from the contact material has been reported. On weighing the varied opinions, the consensus seems to have been that, compared with other available processes, contact aerators were not an attractive proposition.

The question now arises as to whether the modifications incorporated in the Hays process can turn the scale in the opposite direction. No doubt the proprietors of the process honestly think that it can, but it is doubtful whether the evidence yet available will carry universal conviction. It would appear that the main point of the Hays process is the application of a stage working-process, enabling each unit of the process to specialize in its own particular work. But this is not new, for two- and three-stage operation of contact aerators has been employed in Germany for some time.

Summary in brief

It would seem that fundamentally there is nothing new in the Hays process. Its claims to consideration and hopes of success rest rather on careful attention to detail and modifications in design. The basis for design, on the average of the three consecutive hours of heaviest load, is of interest and has considerable justification. On the other hand, the cutting down of settling tank capacity on the grounds that the contact chambers act as sedimentation tanks may not be found reassuring by many people.

Indeed, the settlement of sludge in the contact chambers may be very detrimental unless the sludge is removed continuously or very frequently. This will inevitably cause considerable expenditure in dealing with large quantities of very watery sludge, a point which seems to have made itself felt already. When discussing contact aerators, Imhoff stressed that "the configuration of the tank bottom must be such that sludge cannot accumulate upon it."

Fig. 1 Work started at one end of a long wharf for loading lend-lease materials and advanced offshore.

Long Wharf Constructed in Five Months

***Contents in Brief**—Extensive new pier facilities, including an 81-ft. wide wharf 2,350 ft. long and nine miles of railroad track have recently been completed at one of our ocean ports. Four floating rigs drove the 7,000 wood piles required for the wharf, and a 100-man carpenter crew followed immediately to add 120 ft. of wood deck in two 10 hr. shifts. Working from daylight to dark 200 men were able to complete the railroad yards several weeks ahead of schedule.*

BUILT PROGRESSIVELY from one end, a half-mile long timber wharf was completed in five months to speed shipment of lend-lease materials to the Allied forces. More than 7,000 creosoted wood piles, including a few 100 ft. long, had to be driven to provide 26-pile supporting bents on 10-ft. centers. On the 81-ft. deck a wide concrete trucking roadway and two railroad tracks, with the space between the rails filled with bituminous concrete, was added. The project also included two large railroad classification yards to provide ample dock-side storage.

The wharf is built in an open "L"-shape around an exposed point of land (Fig. 3). To start construction considerable dredging was required to provide a 35-ft. depth of water on the ocean side of the structure. This work was done by a large dipper dredge, which also sloped the bank in the same operation in order to hold the bank from sloughing and keep the requisite berth depth along the face of the wharf.

Four drivers used

Four floating drivers with leads 55 to 75 ft. long were used for driving the piles, one of the rigs having adjustable leads to accommodate driving the three batter piles needed for each bent. A 5,000-lb., single-acting hammer was used on each rig, driving the piles to the design load of 15 tons. The soil at the site varied from a hard, dense sand to soft blue clay. Because of the latter, about one-fourth of the piles required the addition of skin lags near the tip of the pile to increase the circumferential area as a skin-friction aid. The lags were rough timbers nailed to the pile with boat spikes.

Driving procedure followed was to have one rig drive the first few rows of piles on the landward side of the pier and the inner batter piles. The other rigs followed, each of which drove about one-fourth the piles in each bent, and then moved on to the next. This scheme was necessary in order to provide the working clearances for all of the floating rigs and at the same time permit all of them to operate at once. Fir logs were used where long piles were required and pine piles were used elsewhere. The piles were delivered on catamarans or floated to the point where needed.

In driving the piles one long shift from daylight to darkness was employed during which the four rigs could drive 140 piles to a penetration of between 20 and 40 ft. Where the

access roads join the structure, steel sheet piling was used to face the landward side of the wharf, but for the greater part of the structure's length this type of piling was not required.

Wales pull piles into line

When all the piles for a bent had been driven, the piles were cut off at the desired elevation by air driven saws operated by men working from small rafts. A temporary wale was added on either side of the bent and the piles brought into line by twisted wire ties between the two wales. Construction of the timber deck followed.

In adding the deck the piles of each bent were joined at the top by two 4x10-in. side plates and a 12x12-in. cap. The stringers were 8x14-in. members on a 2-ft. 3-in. spacing, except under the railroad tracks, where larger stringers on a closer spacing were used. The timber decking consisted of 6-in. planking under the railroad tracks and a 4-in. deck in the other areas. All of the stringers have bolted connections to make them continuous and to eliminate all expansion joints. The stringers also are drift pinned to the pile caps.

Cranes place deck timbers

Total lumber requirements were 3,500,000 bd. ft. of creosoted stock, and all the material except the deck was placed by truck and crawler cranes of 1 to 1½ cu. yd. capacity and with booms 40 to 75 ft. long. The cranes operated on the completed portion of the structure, and the timber was supplied by three rubber-tired lumber carriers delivering materials from a storage yard parallel to a railroad spur extended to that end of the wharf where construction started. Materials also were delivered to the yard by truck.

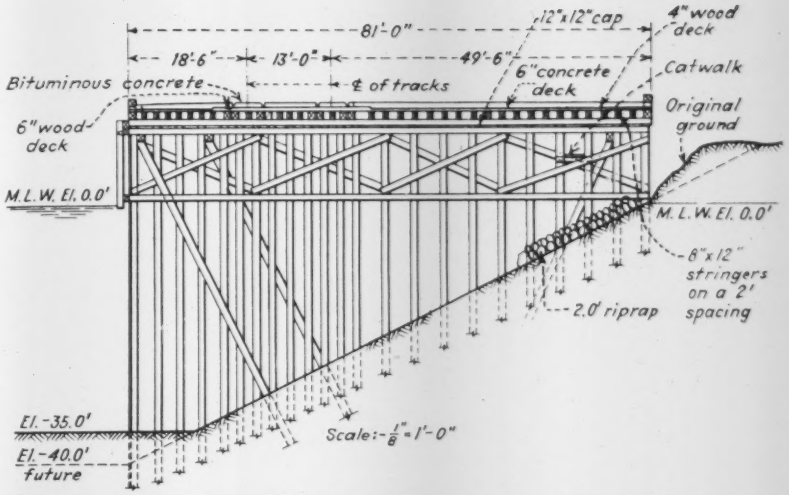


Fig. 2. Cross-section through the wharf showing a typical bent. It is to be noted that two railroad tracks and a wide roadway are provided.

In construction of the timber deck two 10-hour shifts were employed and with a 100-man crew daily progress by the contractor was six bents or 60 ft. of wharf. The average crew for all operations on the wharf was about 300 men, including the pile driving crews.

Equipment employed on the timber work by the contractor, in addition to that previously mentioned, included: Four 365-cfm. air compressors, which were moved along the deck as the work progressed; 24 pneumatic wood borers; 4 impact wrenches; 12 pneumatic spike drivers; 6 chain saws, and 4 gear saws. Air was delivered to the pneumatic tools by a 2-in. pipeline along the landward side of the wharf.

Concrete for surfacing the deck to provide the 6-in. thick trucking roadway was delivered in agitator trucks from a central mixing plant and the bituminous concrete was purchased from a nearby commercial plant. Addition of the concrete to the timber deck did not start until the deck was nearly complete for the entire wharf, and this work involved no special problems.

Two big railroad yards

An important part of the project was construction of 37,500 ft. of railroad siding in two large classification yards (Fig. 3). Ballast for con-

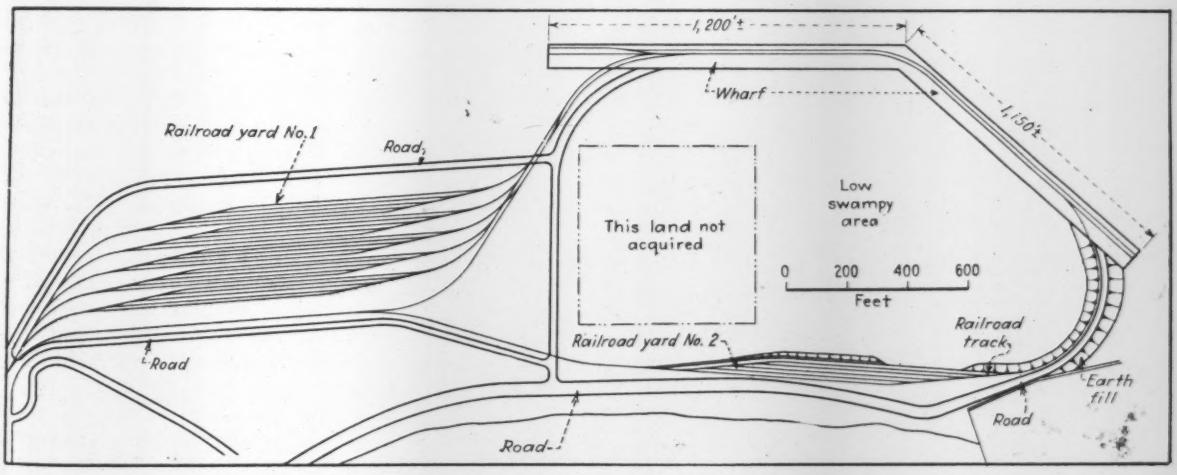


Fig. 3. In addition to the wharf, which totals 2,350 ft. in length, two large railroad yards requiring nine miles of track were constructed. Access to wharf from the yards is by both highway and railroad.

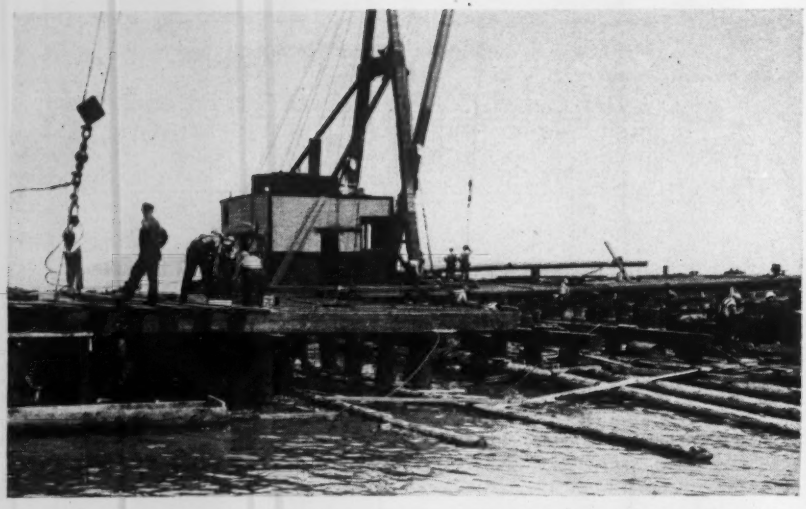


Fig. 4. To draw the piles for a bent into line, a temporary wale was placed on each side of the piles and twisted wire ties added between the wales. Workmen on small timber rafts cut off the piles at the desired level with pneumatic saws. Right: To permit use of piles of the length available, bearing value of some members were increased by adding skin lags.

struction of the two railroad yards was delivered over the industrial track extending to the site when the project was begun. The railroads rails, which were of 80-lb. weight, were delivered by truck as required.

The railroad work continued from daylight to darkness and an average crew of about 200 men were employed on this construction. In placing of the rails all spikes were hand driven, compaction of the ballast was by machine, and raising of the track was by gasoline-driven jacks or lifting machines.

Reservoir Storage Capacity Enlarged to Meet Norfolk Water Demands

To increase the storage capacity of the Lake Burnt Mills reservoir from which Norfolk, Va., draws part of its water supply, an earthfill dam and concrete-slab spillway have been constructed.

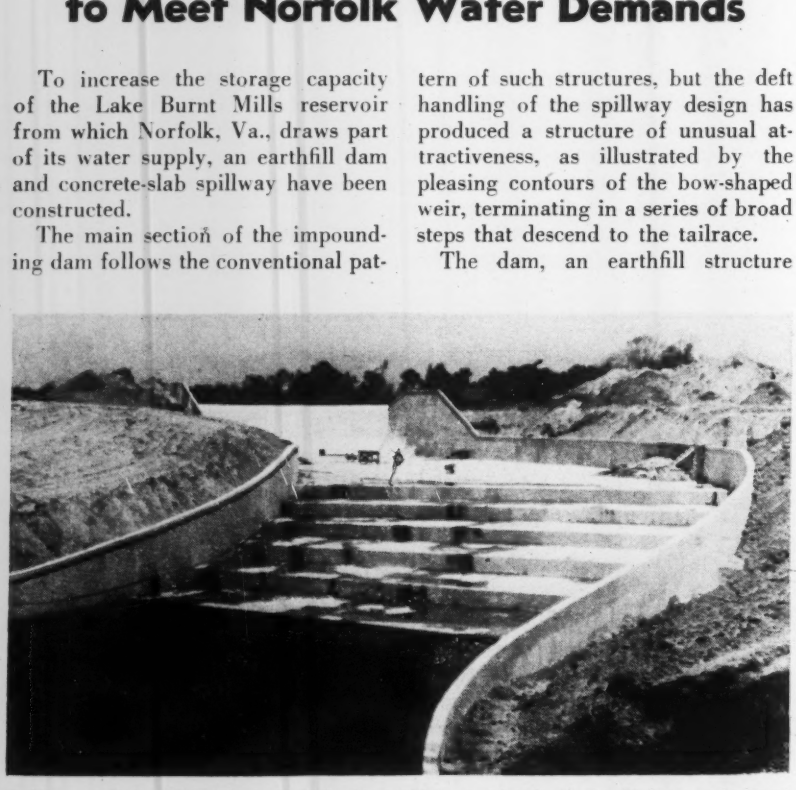
The main section of the impounding dam follows the conventional pattern of such structures, but the deft handling of the spillway design has produced a structure of unusual attractiveness, as illustrated by the pleasing contours of the bow-shaped weir, terminating in a series of broad steps that descend to the tailrace.

The dam, an earthfill structure with an 8-in. reinforced concrete surface on the upstream side and a concrete toe-wall at the bottom of the slope, will rise to an elevation of 40 ft. with a 35-ft. crest at the spillway. It will be 18 ft. wide at the top. The reservoir site covers 700 acres and the dam will impound about 3,000,000 gal. of water.

A 10,000,000 gal. pumping station on the downstream side of the dam will pump water from the reservoir to Lake Prince, chief source of Norfolk's water supply, a distance of about 2 miles.

The Lake Burnt Mills dam and reservoir are part of a $2,255,000 waterworks improvement program (*ENR* Oct. 8, 1942, p. 474) that was launched early last year by the city of Norfolk, with the assistance of the Federal Works Agency. The work includes construction of a second supply line from Lake Prince to Norfolk, an addition to the city's filtration plant, the installation of a 15 mgd. pumping unit at the Lake Prince pumping station and a 10 mgd. pump and 450 hp. motor at the pump station in Norfolk.

The dam and spillway were designed by the Norfolk municipal department of public works. General contractor on this work was the Liberty Contracting Co., Richmond, Va.



Spillway of the 40-ft. dam at Lake Burnt Mills reservoir that will impound about 3,000,000 gal. of water to increase Norfolk, Va., water supply.

Precast Box Conduits for Runway Drainage

C. R. Otto
U. S. Corps of Engineers, Denver, Colo.

***Contents in Brief**—Dish-topped box conduits of interlocking two-piece precast concrete units form a new type of runway and apron drainage at two army air fields in the West. The conduits, their tops slotted to receive the runoff, are set flush with top of runway to serve as extension of paving. Walls and top of units were thickened to eliminate reinforcing.*

COLLECTION AND REMOVAL of surface runoff in the shortest possible time is the primary requirement of an airport drainage system. This requirement is being met at two army air fields in the Rocky Mountain area by a new design of precast concrete box conduits, their dished tops slotted to receive the runoff and placed flush with top of paving as an extension or part of the runways and aprons. The conduit is made up of rectangular two-piece interlocking units, originally designed in reinforced concrete, but actually built with thickened walls and tops to eliminate the steel. Size of conduit is varied to meet runoff conditions. Storm sewers tap the conduit at intervals to conduct the collected water away from the field.

Continuous box drains were adopted following unsatisfactory experience with the elaborate drainage system installed in 1940 at one of these western airfields (*ENR* Oct. 24, 1940, p. 547) consisting of 10-ft. lengths of box drains spotted at intervals of 200 ft., with intervening drainage of open joint pipe laid in gravel and crushed stone. Drifting sand and dust has plugged up the French drain sections of this system to an extent that they are ineffective.

The rapidity with which runoff is collected is a function of the frequency of inlets and the proximity of the collection system to the runway. Both of these factors are taken care of to the maximum degree in the new continuous box conduits.

Precast units form conduit

Conduits used are made up of concrete units cast in two parts, a bottom trough section and a cover slab with short side walls. The horizontal joint at contact between the two sections is notched to provide an interlock in the longitudinal direction, and the notches are beveled at their ends for a transverse interlock. The two sections fit together to break vertical joints; one top section covers half of two adjoining bottom units tying them together.

Both bottom and top sections are 5 ft. long. Notches at the ends of the cover plates form slots for entrance of water to the conduit. The top surface of the cover unit is dished to catch the runoff.

Two standard sizes were installed at the airports, 10x10-in. and 15x15-in. inside dimensions. Other sizes are available to meet special conditions, such as wide, shallow boxes for carrying the flow under pavement. At intervals a set of two deeper bottom sections were placed in the line as sand traps. To clean the traps, in fact to clean or inspect any part of the lines, the covers can easily be removed.

Where a tight conduit is desired the lower units are cast with notches in the end walls and a groove at the bottom joint to receive a mastic seal. However, most of the lines are laid with open joints.

Original design of the units specified 3-in. walls and a 5-in. top, reinforced in both directions with light rods. To save steel the sections were increased to 4-in. walls and a top thickness of 7½ in.

For draining runways the conduits were placed next to and flush with the edge of pavement. In aprons and at runway intersections the lines become part of the paving. The storm sewers are connected to the conduits through single deep units, acting as catch basins, cast with a hole in the bottom for connection to the drawoff pipe.

Several considerations favored the adoption of this type of drainage system: The rapid collection and removal of surface run-off; complete accessibility of the collection lines; the elimination of catch basins; the absence of French drains; the absence of gutters; approximately two per-

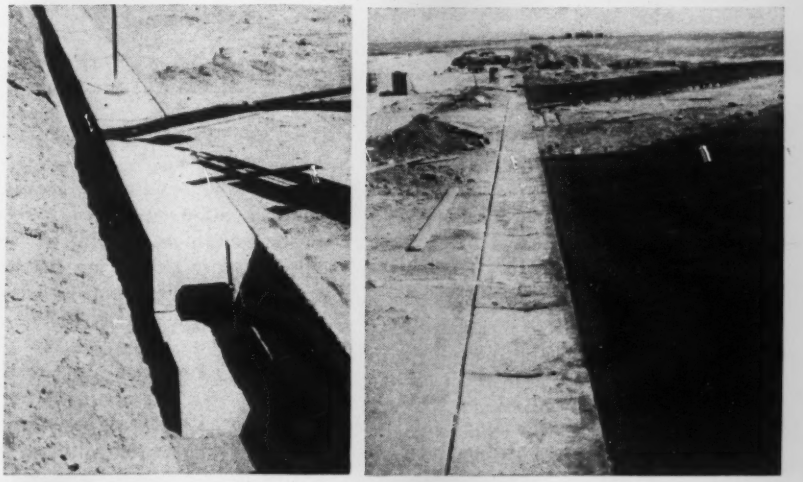


Fig. 1. Concrete box conduits for runway drainage. Left: 10 x 10-in. drain along side of runway. Right: 15 x 15-in. units at runway interesection; apron drains are installed in same manner.

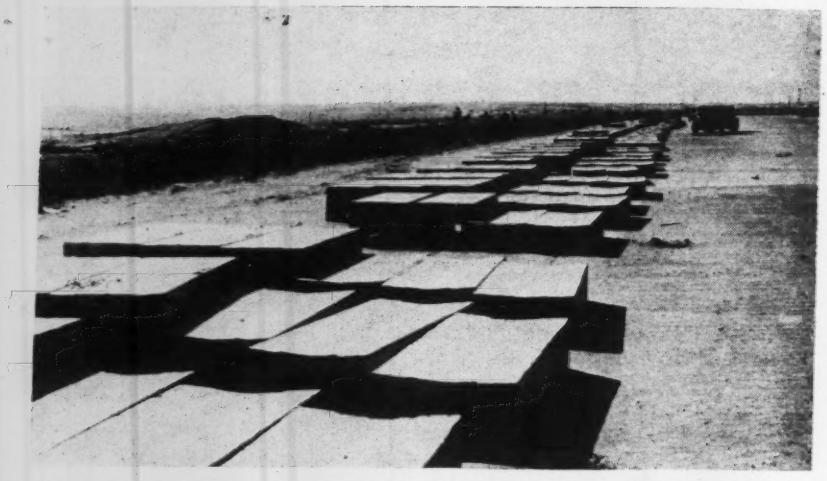


Fig. 2. Precast units ready for installation. Dished surface units are top sections.

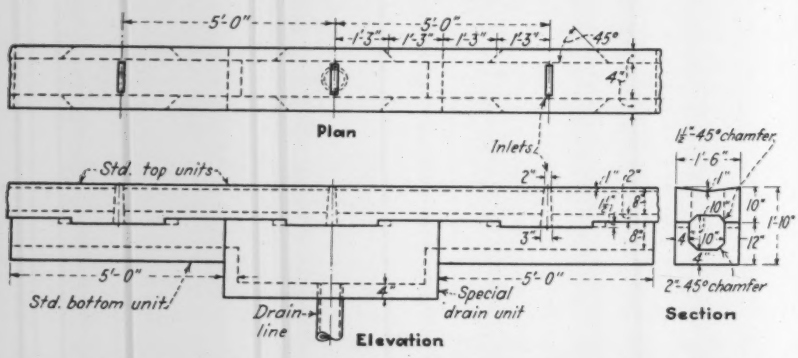


Fig. 3. Continuous box drains are made up of two-piece interlocking precast units that break vertical joints. These are details of small size drain; other sizes are similar in design.

cent increase in the usable width of runway; an appreciable saving in metal catch basin covers, and a probable saving in maintenance costs.

The conduit was designed by F. S. Wendelken, Denver, Colo., and made and supplied by the Lock Joint Pipe Co. Installation was under the direction of the Denver District of the U. S. Corps of Engineers.

California Provides Funds to Speed Planning of Postwar Projects

Prompt and definite action on postwar planning programs is assured by recent action of the California state legislature. With the personal cooperation of Governor Earl S. Warren and the active support of the Associated General Contractors of America, postwar construction authorizations and appropriations totaling $148,350,000 were granted, and a state Reconstruction and Reemployment Commission, headed by Charles H. Purcell, state director of public works, was appointed.

Legislation also was adopted authorizing private capital to acquire by condemnation blighted areas within cities which should be replaced or modernized by large housing projects or similar improvements.

The duties of the new commission are to "formulate plans for the reemployment, rehabilitation and reeducation of war veterans, reconversion of industry to peace standards, full development of the natural resources of the state, and cooperation with other Western states in the development of a national economy."

The commission is definitely instructed to plan for and promote improvement of the highway and freeway systems of California, and the necessary reconstruction and expansion of state buildings, particularly state hospitals and institutions.

Money authorization

Supplementing the authority given the state Reconstruction and Reemployment Commission, the state legislature authorized or appropriated $43,600,000 for state building construction and $70,000,000 for highway construction. The sum of $1,250,000 was also appropriated for preparation of state building plans and specifications, and $12,000,000 for state highway plans and specifications. An appropriation of $1,500,000 was made to the counties for highway plans and specifications, which it is estimated will develop a $20,000,000 county road program.

In addition, a "war catastrophe reserve" of $25,000,000 was established, to be used if required as an emergency fund in the event of invasion; otherwise it will be allowed to accumulate as an additional postwar fund.

It is anticipated that the various state officials who are members of the commission can utilize their departmental staffs in the preparation of sound programs and policies. Each member of the commission is also appointed as chairman of an unsalaried citizens' advisory board of five members.

Members of the commission

The newly appointed commission replaces the old State Planning Board, and receives the board's funds of approximately $100,000. Commission members are Charles H. Purcell, director of public works, chairman; John S. Hassler, director of finance, vice-chairman; Percy C. Heckendorf, director of professional and vocational standards; Robert Gordon Sproul, president, University of California; William H. Moore, acting director of natural resources; William J. Cecil, director of agriculture; Paul Scharrenberg, director of industrial relations; Walter S. Dexter, superintendent of public instruction; and William T. Sweigert, executive secretary to the governor.

It is expected that the commission will start promptly on purchase of rights-of-way and preparation of plans and specifications.

Ordnance Plant Bridge Built of Old Trusses

E. L. Durkee
Engineer, Erection Dept., Bethlehem Steel Co.

***Contents in Brief**—By using nine remodeled railroad trusses, a new river bridge has been erected for an ordnance plant in Tennessee without requiring much new steel. A simple and efficient system of dismantling and re-erecting the trusses resulted in speedy completion of the structure.*

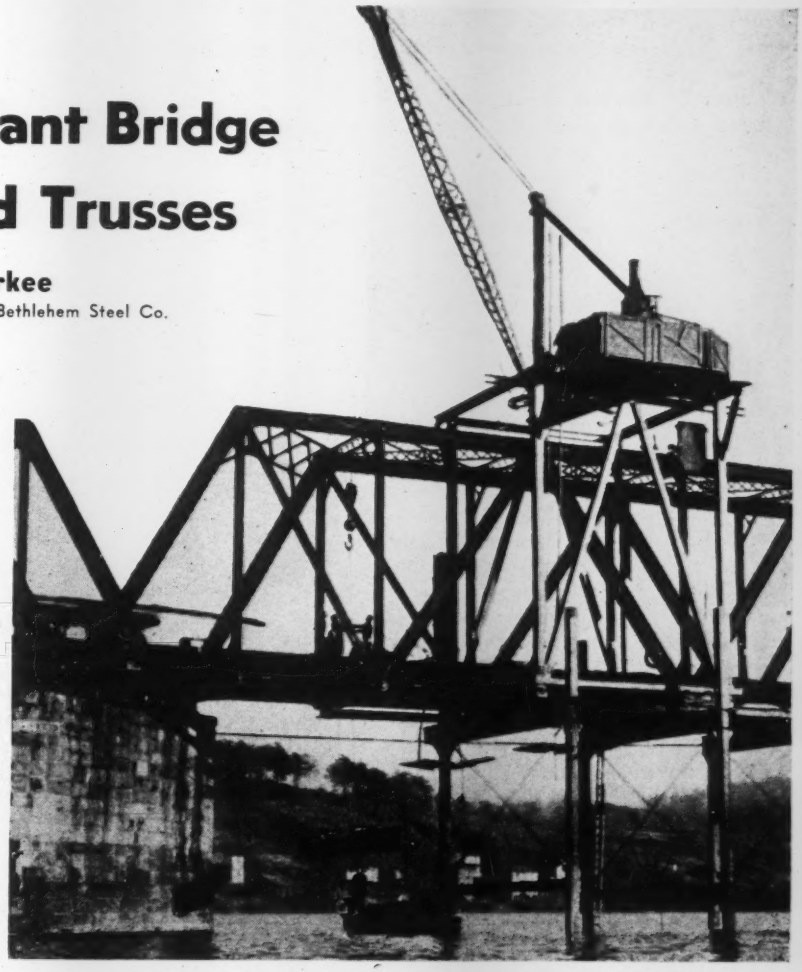


Fig. 1. Part of the dismantling was done by a gantry traveler that drove the falsework piles and then moved to position on beams supported on the falsework outside the trusses. A smaller traveler on the deck completed the work.

TWO RAILROAD BRIDGES, one of four and the other of five truss spans, built nearly 50 years ago at Lynchburg, Va., by the Southern Railway Co., were dismantled last fall, moved and reassembled into three highway bridges of two, three and four spans at an ordnance plant in Tennessee. Five of the spans were 144 ft., three were 159 ft. and one was 182 ft. long. The methods used to dismantle repair and re-erect them involved a number of interesting procedures. Another old railroad span, and about 90 tons of new steel, as well as a considerable length of timber trestle, were required to complete the ordnance plant bridges, which crossed a shallow but expansive river.

In order to support the old bridge trusses as the members were removed, falsework bents were constructed at each panel point, requiring the use of 175 tons of steel piles, beams and bracing all taken out of the contractor's stock. Several methods of dismantling the old spans were considered, involving different types of equipment, but it was finally decided, in the interest of speed, to use a traveling gantry derrick, completely enveloping the spans and supported on the falsework, which was to be supplemented by a small traveler operating on the old deck of the through trusses.

The gantry traveler consisted of two rigid frames set outside and enclosing the trusses and braced together to support a stiffleg derrick on top, which could reach both forward and backward. Carried on the beams that braced the falsework bents, the gantry erected the falsework as its first operation, then took out the top lateral bracing of the trusses, to permit free operation of the deck traveler. It also dismantled the top chords and some web members of the trusses to equalize the work of the two derricks.

The deck traveler was a small stiffleg derrick operating on the bridge floor and having a boom that could swing both ahead and behind. With the trusses removed, it could swing its boom freely and, standing on a clear floor panel it first removed the remaining truss members ahead, then the floor behind, and finally the falsework, which was landed on a small barge and floated ahead to the next span for re-erection by the gantry. To provide a working deck for the small derrick and the highway trucks used in removing old steel, the original 8x11-in. by 11-ft. ties, were laid flat on the stringers, spaced about 1-in. apart and anchored occasionally with drop bolts to prevent lateral movement. The old guard rails were used to form a curb for this roadway for the trucks and traveler.

Dismantling trusses

All truss spans were pin-connected, with trusses spaced 16 ft. c. to c., and a preliminary examination indicated the pins and Lomas nuts to be in very good condition. Many of the diagonal members were eyebars or adjustable rods with forged loops at the ends. There were no signs of undue wear where these members bore on the pins, and there was no evidence of slotting or "shouldering." However, the pins were frozen fast by

rusting, and considerable difficulty was experienced in breaking them loose for removal.

Pins in the top chord could be driven through from the outside, after removing the top lateral struts, but the pins in the bottom chord were directly opposite the floorbeams and a different procedure had to be used. These latter pins were removed by pulling from the outside, since the floorbeams were cut back only enough to permit removal of the Lomas nuts. In general, the two outside bottom chord eyebars were removed first, leaving enough room for a steel slab with a bored hole the size of the pin to be slipped on and held by the Lomas nuts. Two 1¼-in. rods were threaded into this slab and the other ends passed through a similar slab or yoke which was supported by the steel falsework pile at each panel point. A timber strut was wedged between this pile and the truss panel point so the nuts on the pulling rods could be tightened to remove the pin.

Pins were cleaned and liberally treated with penetrating oil several days in advance of their removal and, before pulling them, a driving nut was placed on the outer end of each pin and a few blows struck with an overhauling ball on the derrick falls to break the pin loose. However, the pulling force required to start the pins elongated the pull-rods, damaging their threads to a degree that prevented smooth turning of the nuts, so a shackle was attached to the pulling yoke on the pins, and a line from the derrick falls was connected to it passing over a single sheave block fastened to the falsework pile opposite the end of the pin. By taking a strain on this line and jarring the pins with the overhauling ball they were gradually and steadily "worked" out. No pins were damaged, but some Lomas nuts had to be replaced.

Fig. 2. Top chord pins were easily driven out with an overhauling ball swung from the stiffleg derrick.

Dismantling of the two old bridges, including the removal of about 31,000 rivets, driving and removing the falsework under each span, and moving all equipment 1,300 ft. across the intervening island was accomplished in three months, or an average of ten calendar days per span. There were a total of 1,240 tons of steel in the nine old spans at Lynchburg.

Alteration of trusses

Considerable alteration of the old trusses was required, as they had been built originally on a 45-deg. skew, while the nature of the new crossing required them to be re-erected as square-ended spans to avoid serious obstruction to the stream, which was subject to sudden floods. Alteration of three of these truss spans was not difficult since their end or skewed panel was equal in length to the intermediate panels, and squaring-up of each span was readily accomplished by simply shifting one truss endwise one panel length. Old latera bracing for top and bottom chords was used without change except for the addition of one new panel of bracing.

The skewed end panels of the other six spans were not equal in length to the intermediate panels, and shifting one truss endwise would not accomplish the desired results. However, by turning one truss of each span end for end and shifting it end-wise the length of the skewed panel, all corresponding panel points of the two trusses were placed opposite each other. Also, in reassembling the trusses that had been turned, the vertical web members were rotated 180 deg. about their longitudinal axis to bring the floorbeam connections on the inside face of the truss. Likewise, all lateral plates on the chords of this truss were removed, turned over and re-riveted to the opposite flange, with a few additional holes being drilled to accommodate the relocated bracing. New lateral plates were provided for the end panels.

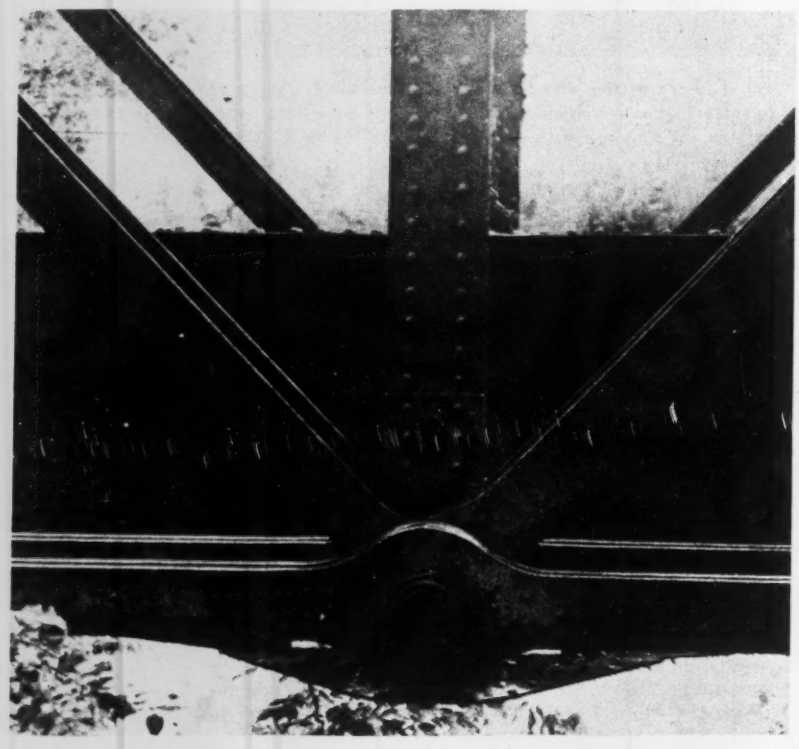


Fig. 3. Pins in the bottom chord were directly opposite the floorbeams and could not be driven out. A pulling yoke, therefore, was made to remove them.

Skewed portals were discarded and w portal bracing furnished along th one new panel of top and bottom acing for each span. The "end" orbeam of each span originally med into the end (or L_0) panel int of one truss and into the first erior (or L_1) panel point of the posite truss, resulting in different d connection details. Stringers in e end panels of the old truss spans d been supported on steel pedestals sting directly on the piers, their ter ends being braced by a diagonal rut between the L_0 points of the usses.

When re-erected as square spans ere were enough floorbeams for all termediate points and for one end nel point, but not for the other. onsequently a floorbeam was placed the expansion end only, while at e fixed end the stringers were sup- rted on pedestals directly on the asonry. Splicing the short stringers the end panels to make full length embers for the new spans was im- ractical. so new end stringers were quired; and fortunately the con- actor was able to furnish them from s erection stock.

Existing holes for floorbeam con- ctions to truss members were aintained by cutting the two end oorbeams squarely in two at the nterline and reassembling them as o symmetrical beams, one having e intermediate panel point connec- on details at each end. and the other aving L_0 end-connections. The lat- r was used at the expansion end of ans to eliminate the need for sepa- te stringer expansions on the piers. ew web and flange splice material ad to be furnished for these end oorbeams.

With but few exceptions all orig- al truss bearing shoes were re-used ithout change. Although they had ot been serviced for a number of ears they were still in reasonably ood condition except for a consider- ble amount of surface rusting, which ad not damaged them structurally. xpansion shoes were of the conven- ional roller bearing type, and their ollers were in a sufficiently good ondition that they could be cleaned atisfactorily at the bridge site. Some ower bearing plates and one or two hoes bearing on top of the roller ests were badly rusted and had to e replaced. The fixed shoes, which arried a single bearing pin, were enerally in good condition, and were

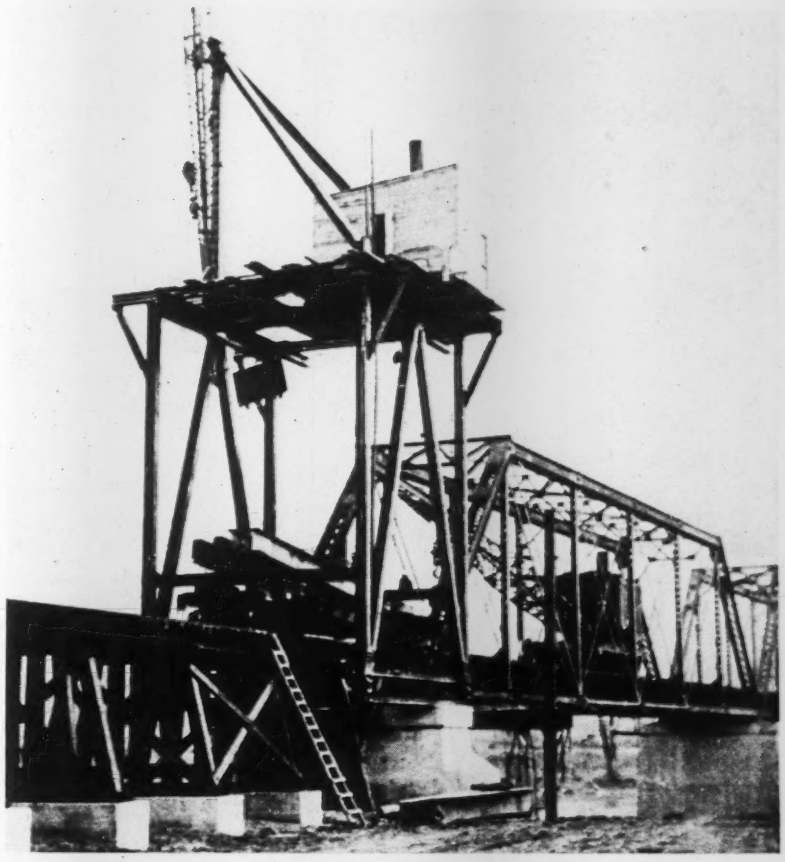


Fig. 4. After re-erecting one crossing, the gantry traveler was blocked up on a flat car and pushed to an adjoining bridge site by a locomotive crane.

reused with only a small amount of cleaning and minor repairs.

A second gantry traveler of exactly the same type and construction as the one used for dismantling the old steel was used for re-erecting the nine truss spans in the new structures at the ordnance plant. The same type of steel falsework piles, bracing and gantry track beams were also used. A yard was established near the end of each new crossing and serviced by a crawler crane or locomotive crane. Here all refabricating, scraping and cleaning were done, and the first coat of paint was applied. The material was then run out on flat cars to the gantry, which first erected all falsework and the floor. Truss members and lateral bracing were then erected to complete each span in turn before proceeding to the next.

Specifications for the bridge built in 1895 called for "soft steel" for all members except eyebars, pins, counters and turnbuckles. "Medium steel" was specified for eyebars and pins, and "iron" for counter rods and turnbuckles, due no doubt to the forged loops at the ends. "Medium steel" was specified throughout for the bridge built in 1903.

Steel in both bridges was in reasonably good condition, showing only surface deterioration that had occurred in the eight years since they had been abandoned. It was necessary to de-scale and clean the members before repainting, but little steel had to be replaced.

All work of dismantling old bridges and re-erecting them in the new structure was done by the Bethlehem Steel Co., under the direction of Oscar Brunn, general superintendent; L. F. Kirkley, resident engineer, and W. S. Wicks, junior engineer. The ordnance plant was built for the United States Army, Maj. E. R. Gates, district engineer, by the Fraser-Brace Engineering Co., which acted in the capacity of architect-engineer-manager under the direction of Alexander Allaire, general manager, Harry Englander, works manager, and L. D. Brown, construction engineer. The Charles T. Main Co. was architect-engineer for the Fraser-Brace Co.

Many-Sided Reservoir Simplifies Formwork

Fig. 1. One reservoir complete and concrete being placed for the lower 12-ft. of the walls of the second structure

IN ORDER TO SIMPLIFY FORMWORK and thus speed construction two 140-ft. dia. reinforced-concrete water reservoirs for a Midwest war plant were built not circular but with 46 sides each about 10 ft. long. In addition to simplifying formwork, this type of construction permitted use of the forms with few alterations for other purposes at a later date. Furthermore, construction costs were less than those estimated for a circular reservoir and the project was completed much sooner than otherwise would have been possible.

The open-top reservoirs are each of 2,500,000-gal. capacity. Bottom slab is 8 in. thick over a 6-in. thick gravel fill on outcropping rock. The slab is reinforced with a mat of ½-in. dia. bars at 12 in. centers both ways. Its outer edge rests on the inside of a 4-ft. wide, 15-in. thick continuous circular footing that supports the wall.

Parallel 4-in. dia. vitrified tile drains on 20-ft. centers were placed under the slab in gravel-filled trenches. Each of the reservoir floors was constructed in one continuous pour with necessary concrete delivered by agitator trucks.

Walls vary in thickness

Separated from the bottom slab by a 2-in. thickness of poured asphalt, and resting on the footings previously mentioned, the walls are 24 ft. high. For their lower 11 ft. they vary in thickness from 2 ft. 4 in. to 1 ft. 3 in. and for their remaining height are of constant 15-in. thickness, except for a 2 ft. 6 in. wide cap at the top. Reinforcing in the walls consists of three layers of horizontal steel in the bottom portion and two layers in the top. All the horizontal steel is tied to ⅝-in. round vertical bars on 1-ft. centers.

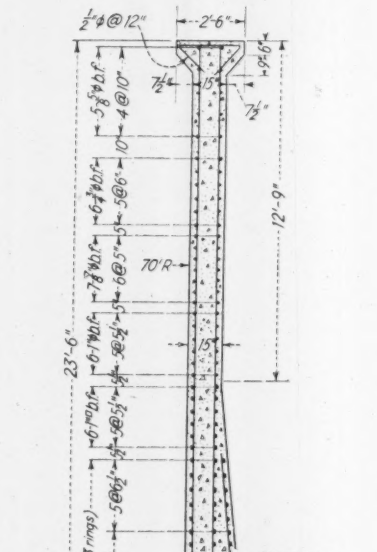
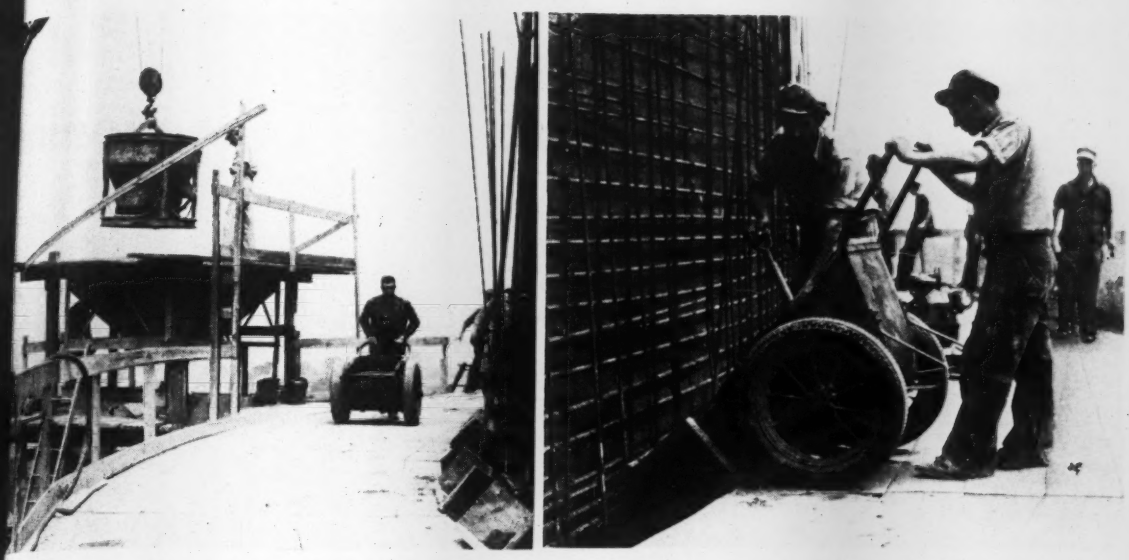


Fig. 2. Typical cross-section through reservoir wall. In constructing the wall the bottom 12 ft. of variable thickness was built in one pour and the remaining height in a second placing, which resulted in one horizontal joint.

In constructing the walls 10x12 form panels built of 1x6-in. dressed lumber over 2x6-in. vertical studs on 16-in. centers were used. By making the sides straight instead of curved it was not only possible to use stock made from lumber of smaller dimension but it was unnecessary to cut the studs on a band saw to provide the curved surface. Thus, the straight sides, which were suggested by the general contractor, made possible a lower cost structure because of the large saving of both materials and labor. More important, the reservoirs were made available several days earlier than first thought possible, which permitted placing the war plant in operation that many days sooner.

Inner forms erected first

The inner forms were erected first for the full height of the wall and the reinforcing steel placed for the lower 12 ft. of the wall, plus the vertical steel and one layer of the horizontal reinforcing for the remainder of the wall. In adding the horizontal steel the bars were not bent as chords of a circle but were carried around the inner forms much as if they had been for a circular structure. All circumferential bars were lapped 45 diameters, the laps being staggered



3. Concrete is delivered by agitator trucks, lifted by 1-yd., bottom-dump bucket handled by crawler crane to a . yd. hopper, and transported to forms by rubber-tired buggies.

lapping bars separated for better crete bond. A maximum of 12 s was permitted in any one ring of circumferential steel.

With steel in place for the lower tion of the wall, the outside forms, ich were very similar to the inner nels, were erected for the bottom ft. of the wall. The concrete was ced in one continuous pour to that ght for the entire circumference the structure. The concrete was livered by agitator trucks, elevated two 3-cu.yd. hoppers in 1-yd. bottom-dump buckets handled by crawler cranes, and distributed by rubber-tired buggies. Vibrated in place, the concrete was placed in layers not over 18 in. deep.

One horizontal joint

In construction of the remaining height of the wall, the necessary reinforcing steel was added first and next the upper outside forms were placed on top of those already in place. The remainder of the wall was completed in one pour, thus making only one horizontal joint necessary in the walls.

Construction of the two reservoirs required 225 tons of reinforcing steel and 10,270 cu. yd. of concrete. A 3,000-lb. concrete was used for the footings and floor slabs, and a 3,500-lb. concrete for the walls. The reservoirs, including a valve chamber, were built in less than two months at a cost of $89,000.

Because of military restrictions the location of the reservoirs cannot be given nor can those in charge be mentioned.

Law Prohibiting Highway Billboards Upheld

The Vermont supreme court has nded down a decision in passing on the constitutionality of a Vermont state law that prohibits the ection of billboards along its highay rights-of-way, which by its interetation of federal law may serve as guide to other states where similar w is on the statute books or where ch a law is being considered.

The court not only declares the ermont law constitutional but demnstrates that every state can restrict, even prohibit, highway billboards ithout infringing any constitutional ights of the billboard industry.

"There is no inherent right to use he highways for commercial purposes," the court declares, and points ut that the billboard is essentially use not of private property but of the public thoroughfare. It is similar to the use of the highway by bus and trolley lines, for which uses permission may be granted or withheld by the state.

The court also declares that the private property owner has no inherent right to lease his highway for commercial advertising unless such advertising applies solely to business on the property.

That the property owner has certain inherent rights in the adjoining street or highway, such as ingress, egress, light and air, has long been recognized by the courts. These rights are known as easements and are governed by the law of easements. The right to be seen from the highway (the factor which gives the billboard its value) is likewise an easement appurtenant to the land abutting upon the highway. But, according to established law, all such easements exist solely for the benefit of the property itself.

The right-to-be-seen or visibility easement entitles the property owner to maintain highway advertising only if it pertains to the property itself, its sale, its rental, or business conducted thereon. It does not include commercial advertising foreign to such business.

Under this court ruling, the property owner may lease space to billboards so long as there is no law forbidding it. But if the state enacts a law restricting or even forbidding highway advertising, no one can legally claim that he is deprived of any constitutional rights.

Dollar Economies in Concrete Proportioning

R. F. MOSS
Vice-President, Scientific Concrete Service Corp.
Washington, D. C.

***Contents in Brief**—Inadequate water control contributes more to uneconomical proportioning than any other single factor. Both too little and too much water costs money. Accurate water control enables specified strength to be produced with less cement or provides greater strength with the same quantity of cement and improves durability. Field precision control methods and equipment are available to give proper water control.*

LABORATORY ACCURACY in the concrete mixing plant has long been the goal of the concrete engineer. He knows that if the results attained with regularity in the laboratory could be duplicated in the mixing plant and on the job the outcome would be an overall improvement in concrete efficiency—in its strength, uniformity, durability and economy. And he also knows that the key to this duplication of results is the ability to apply Abrams water-cement ratio law in the field with the same accuracy that it can be applied in the concrete laboratory.

As is well known, the water-cement law is usually expressed in the form of a curve showing the relation between 28-day concrete strength and the water-cement ratio. An additional curve giving values that are from 50 to 85 percent of the plotted values is usually established as a basis for designing; engineers frequently reduce these values still farther in actual use because of the difficulty of controlling the water-cement ratio under actual working conditions. The difference between the actual curve and the design curve is a factor of safety to provide for uncertainties in batching, which cause variation in the water-cement ratio, and this factor of safety is in addition to the engineering factor of safety, usually from 4 to 6, that is used for all materials of construction to provide for unknown variations in strength and loading. *Concrete is the only material of construction for which multiple factors of safety are considered necessary.*

Although improper grading and proportioning of aggregates, the use of too little or too much cement, faulty mixing, placing and curing, all contribute to holding down concrete efficiency, the most important factor of all is inadequate water control. Water in the mix, and therefore the water-cement ratio, is difficult to control principally because of water that is carried in the aggregates. The water content of sand can and does vary from nothing to 15 percent of dry weight, and of gravel from nothing to 3 percent. Variations up to 2 percent in an hour or so are frequent, and occur constantly at times.

What do these variations cost? The following examples will show a part of the bill.

Cost of extra factor of safety

Assume that 2,500-lb. concrete is desired and that 300 lb. of water per cu. yd. are required for workability; also that the working values of the water-cement strength curve are 85 percent of the actual values, the difference being the added factor of safety. Assume typical values as shown in the tabulation below.

Actual W/C 0.72 by weight or 1.39 lb. of cement per pound of water	
Design W/C 0.66 by weight or 1.52 lb. of cement per pound of water	
Difference,	0.13 lb. of cement per pound of water

This difference, applied to 300 lb. of water, amounts to 39 lb. At $2.00 per barrel, this will cost 21c. per cu. yd. of concrete. On the same basis, the added cost for 3,000-lb. concrete would be 32c. and for 3,500 lb. concrete 38c. per cu. yd. Assuming a cost of $6.00, $7.00 and $8.00 per cu. yd. for 2,500 lb., 3,000 lb. and 3,500 lb. concrete, the extra factor of safety increases the cost by 3½, 4 and 4.8 percent respectively in the examples—all part of the cost of inadequate control.

This method of calculation, applied to a well known government specification, shows the following results:

As specified				Based on actual strength curve			
Strength Lb. per Sq. In.	Minimum Cement	Maximum Water	W/C By Wgt.	W/C By Wgt.	Cement Required	Possible Savings Cement	Cost/Cu. Yd.
2,500	508#	315#	0.620	0.720	438#	70#	37c
3,000	592#	328#	0.554	0.650	505#	87#	46c
3,500	705#	344#	0.487	0.575	598#	107#	57c

Such savings, applied to the government construction program over the next few years would save millions of dollars for the taxpayers. These savings are possible, and with a parallel improvement in concrete uniformity and therefore in quality.

Cost of moisture errors

Plus Errors—Assume that 2,500-lb. concrete is required, and that the designer selects a W/C of 0.66 by weight, or 1.52 lb. of cement per lb. of water. Due, however, to inadequate water control there is an error in moisture content of plus 1 percent in the gravel and plus 2 percent in the sand. The designed and actual quantities, in a typical mix, would then be as follows:

Material	Designed Mix	Actual Mix
Water	300 lb.	345 lb.
Cement	455 lb.	455 lb.
Sand	1,310 lb.	1,284 lb.
Gravel	1,950 lb.	1,931 lb.

This concrete would have 1.32 lb. of cement per lb. of water, instead of 1.52, and an expected strength of

00 lb., instead of 2,500 lb. To ing it back to 2,500 lb. would re- ire the addition of 68 lb. of ment, which at $2.00 per bbl. would st 36c. per cu. yd. This, of course, in addition to the cost of the ex- a factor of safety and how often ould the additional 68 lb. be added? lso this mix would be much wetter an desired. Here is another part of e cost of inadequate control.

Minus Errors—Assume the same nditions as above excepting that the oisture error is minus instead of us. The designed and delivered uantities would then be as follows:

Material	Designed Mix	Yield	Actual Mix	Yield
Water	300 lb.	.178 cu. yd.	254 lb. (added 50 lb.)	.180 cu. yd.
Cement	455 lb.	.086 cu. yd.	455 lb.	.086 cu. yd.
Sand	1,310 lb.	.296 cu. yd.	1,336 lb.	.302 cu. yd.
Gravel	1,950 lb.	.440 cu. yd.	1,970 lb.	.445 cu. yd.
Total	4,015 lb.	1.000 cu. yd.	4,065 lb.	1.013 cu. yd.

By the plant's estimate 254 lb. of water would be required but the concrete would be too dry, and enough water would have to be added to make it workable. Based on proportions of dry ingredients, 50 lb. additional would be required. This would produce an excess yield of 1.3 percent, valued at 7.8c. in every cubic yard, and this, also, is in addition to the cost of the extra factor of safety.

Such moisture errors occur from batch to batch everywhere, every day, and this is part of the cost of inadequate water control.

The examples given all deal with cost. Of even greater importance to the engineer are strength, durability and uniformity, and these qualities depend predominently on close control of the water-cement ratio. Taking up strength—a typical central mixing plant produces concrete made to a standard commercial mix specification that tests from 2,500 lb. to 4,000 lb. per sq. in. at 28 days. If the water content of this concrete could be controlled so that the maximum variation would be less than 1 gal. per cu. yd. and if reasonable care be exercised in grading and weighing, this same mix could be expected to test from 3,500 lb. to 4,000 lb. per sq. in. at 28 days. The high limit would, of course, be about the same, because water would have to be added to make the concrete workable when the error is too much on the dry side, but closer control would enable it to be attained more consistently, with resulting improvement in the low limit.

This reduction of strength variation to reasonable proportions is accomplished every day in the concrete laboratory, but in very few mixing plants. In this case, enough cement is used to make 3,500 lb. concrete, but the actual concrete produced is so lacking in uniformity that it would be unsafe to rate it higher than 2,500 lb. The cement wasted by this lack of uniformity increases the concrete cost by 40c. to 50c. per cu. yd., much more than enough to pay for the best control.

Accurate control, therefore, enables specified strength to be produced with less cement than is used ordinarily, or greater strength with the same quantity of cement, and it attains these results with an important gain in uniformity and, therefore, in the dependability of the product. Thus, economy and dependability are reached by the same means, a result that could almost stand as a central aim of all engineering.

Importance of durability

It is easy to demonstrate that, within limits, the greater the quantity of cement used the greater will be the concrete strength. For this reason and, to protect their clients from the strength irregularities previously mentioned, many engineers specify, and will continue to specify until better control methods are more generally used, a minimum cement factor regardless of the strength attained.

In emphasizing strength, other essential qualities of the concrete are apt to be overlooked. One of these, durability, is nearly always considered more important than strength. Engineers now know that when sound aggregates are used, cracking—and all failures start with cracks—is nearly always due to volume changes in the water-cement paste, which take place as the setting and curing processes proceed. Therefore, from the standpoint of avoiding cracks, the ideal concrete would contain just enough water-cement paste to fill the interstices of ideally graded aggregates. Within reasonable limits, concrete that has the least water-cement paste for any given water-cement ratio will show the least cracking. The American Concrete Institute, in 1934, published a report containing this statement: "The concrete should be made as lean as possible for the development of adequate strength, stiffness, imperviousness, durability and other essential properties, because any excess cement increases volume change."

The modern engineering approach to this problem is to select the water-cement ratio that will give the required qualities, adopt control methods that will insure accuracy in proportioning, and then use as little of the paste as is necessary, with the best possible grading of aggregates, to give the concrete the required workability.

To economy and dependability we can, therefore, add durability to the results that can be attained by accurate control of the water-cement ratio.

Effect of adding water

It might seem unnecessary to add that correct procedure in mix design and proportioning can be nullified by the whim of a concrete foreman who has his own ideas about water content. The following example shows some of the effects of added water:

Assume 2,500-lb. concrete; 1.52 lb. of cement per lb. of water, and 300 lb. of water. The foreman, however, wants the concrete to run around corners in the forms, does not use vibrators, and demands the addition of 5 gal. of water per cu. yd. The water content then becomes 342 lb. giving 1.33 lb. of cement per lb. of water, and an estimated strength of 2,000 lb. per sq. in. To bring this back to 2,500 lb. would require the addition of 64 lb. of cement, which at $2.00 per barrel would cost 34c. per cu. yd. Also, the volume has been increased by 2½ percent with a corresponding decrease in density, and this at $6.00 per cu. yd. would be worth 15c. The total loss, therefore, is 49c., a price concession made when the water was added.

Few inspectors, would consider a request to allow the use of ⅜-in. reinforcing where ½-in. bars are specified,

but a greater reduction in the quality of the concrete is often approved (by adding water) with little or no hesitation. Concrete foremen and inspectors should have a better understanding of the importance of the water-cement ratio, and the engineer would seem to be the one best qualified to do this job of education.

Irregularities in cement

The one remaining water-cement ratio control problem is the possibility of "irregularities" in cement. This, likewise, is sometimes difficult to handle. Cement is the most expensive ingredient of concrete, and the temptation to "hold out" a few pounds per yard is sometimes irresistible. Honest, full time inspectors can do the job, but such inspection is not always available, particularly on small jobs, and even on large jobs inspectors have been known to succumb to temptation. It is precisely this weakness of human nature that is responsible for the universal use of the cash register. The business of concrete manufacture also needs a "cash register"; some kind of an automatic, tamper-proof inspection that will eliminate that part of the human element.

The necessary features of a precision control method may then be summarized as follows:

1. A method of moisture determination that is accurate, that does not require calculation or the use of tables, and that is quick enough to make it possible to test the aggregates in every batch, when conditions make that desirable.

2. A method of compensation for the moisture content of aggregates that is practically instantaneous in operation, and that likewise requires no calculation or the use of tables. It also must be capable of holding constant the dry weight of aggregates regardless of variation in moisture content. For example, if sand contains 5 percent of moisture, (5 percent of dry weight) 2,100 lb. of damp sand must be weighed out to get 2,000 lb. of dry sand, and this must be changed instantly to 2,120 lb. if the moisture content of the next batch changes to 6 percent. Items 1 and 2 should be capable of holding the water content of concrete to a tolerance of one-half gallon per cubic yard and the dry weight of aggregates to one-quarter percent regardless of moisture variation in the aggregates.

3. An automatic graphic recorder that will show the delivered weight of each ingredient, the moisture content of aggregates, and the moisture compensation made to correct for it.

Fortunately a great deal of progress has been made, in recent years, in the design of equipment for precision batching control, and it is now possible to obtain equipment that will meet each item of the requirements above specified. Modern precision control methods, supplemented by care in the selection and grading of aggregates and in the operations of placing and curing will, it is hoped, make possible the manufacture of concrete approaching steel in accuracy of composition.

This goal should be attainable because, as the above examples show, precision controlled concrete, for any given purpose, is actually cheaper than concrete batched by the prevailing methods of the past decade.

Army Water Testing Method Simplifies Chlorine Residual Check

A simplified method of testing for residual chlorine in water purified with calcium hypochlorite, has been developed by the Quartermaster Corps in collaboration with the Medical Corps and several industrial chemical companies.

The testing method employs orthotolidine in a newly developed tablet form rather than in solution, each tablet representing one cubic centimeter of the liquid. Orthotolidine, a chemical reagent that produces an intense yellow-green color in the presence of chlorine, has been widely used for many years in municipal water plants for determining the extent of chlorination of water.

The tablets are packed in a nested double tube, the inner one of glass containing 50 tablets, and the outer one of plastic serving as a tube for the testing operation. The outer tube has a three-quarter inch transparent yellow band at the top showing the exact color the water should have when tested after chlorine treatment.

In the testing operation, the outer tube is filled to the lower edge of the yellow band with the treated water and a tablet dropped in it and allowed to dissolve. If the resulting color of the liquid in the tube is lighter than the color of the yellow band, the water requires more treatment with chlorine, while an equal or slightly darker color indicates the water has been satisfactorily purified and is safe for use. If the liquid turns an orange color, the water is too heavily treated with chlorine and more untreated water must be added to the supply being tested.

Old method supplanted

The new testing method was devised to replace the more complicated conventional method employing orthotolidine in liquid form. In the old method one cubic centimeter of the solution was measured from a calibrated dropper into a half inch of the treated water in a canteen cup, and the resulting color of the liquid was estimated without benefit of a comparable color such as the yellow band around the outer tube. The new method is expected to make the testing operation much easier and to permit a more exact test under all circumstances.

Method of packaging

To facilitate the entire operation of purifying the water and testing for chlorination, a new package has been designed by the Quartermaster Corps for the ampules of calcium hypochlorite so that each package of 100 ampules will also contain two tubes of orthotolidine tablets, or enough to test all the water than can be purified by the 100 ampules of calcium hypochlorite in the package. Development of orthotolidine in tablet form, together with the design of the package to contain the tablets and the ampules has the double advantage of permitting both purifying and testing equipment to be contained in a small compact package, with little danger of breakage or spilling, and also of conserving vital shipping space to overseas theaters of operations where every drop of water must be purified before use.

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3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

RESERVOIR AND WATER MAINS, FORT WORTH, TEXAS

OWNER: City of Fort Worth, Tex., S. H. Bothwell, city manager; Freese & Nichols, engineers.

PROJECT: Constructing ground storage reservoir, and 24 and 30-in. cast iron water mains in Fort Worth, Tex. (FWA Docket —Tex. 41-588). Involves construction of embankment around reservoir walls; sub-base and fill under floor slab; necessary concreting; floor and wall expansion joints; bar and mesh reinforcing; various sizes of salt glazed vitrified tile; cast iron pipe and fittings for connecting with water mains; wooden manhole covers and ladders; ventilators; and valve and valve box. Also includes 9,350 linear feet of 30-in. cast iron pipe for mains, and 2,075 linear feet of 24-in. pipe with necessary fittings and valves; and replacement of pavement after mains are in place.

CONDITIONS: Contractor to furnish all materials and complete work in 82 days. Rail and highway transportation facilities available. Wage rates specified are: skilled labor, $1.50 per hour; semi-skilled, 75c.; and common, 50c.

BIDS: Project was divided into two parts for bidding, Schedule I for construction of the reservoir, and Schedule II for the water mains. Eighteen bids were received on Schedule I on March 30, 1943, ranging from the contract low of $91,841 to $168,077. On Schedule II eleven bids were opened on the same date, ranging from $137,277 to $185,308.

Schedule I—Reservoir

LIST OF BIDDERS:

1. Gerald Mora, Houston, Tex. (contract) $91,841
2. M. F. Fischer & Son, San Antonio, Tex 97,559
3. W. G. Cullum & Co., Dallas, Tex 102,515
4. Thomas S. Byrne, Inc., Fort Worth, Tex 110,068
5. Ernest Loyd, Cleburne, Tex 110,875
6. Purvis & Burton, Fort Worth, Tex 120,074
7. J. G. Bartholomew, Dallas, Tex 120,664
8. Standard Paving Co., Fort Worth, Tex 122,237
9. Quisle & Andrews, Fort Worth, Tex 128,005
10. Joe Cauker & Crow, Fort Worth, Tex 129,965
11. F. S. Oldt Co., Dallas, Tex 130,230
12. James T. Taylor & Son, Forth Worth, Tex 133,146
13. Waco Construction Co., Waco, Tex 133,181
14. R. H. Folmar, Austin, Tex 137,631
15. Ben Sira & Co., Dallas, Tex 138,135
16. Uvalde Constr. Co., and P. C. Sorenson Co., Dallas, Tex. 144,407
17 Williams & Whittle, Dallas, Tex 150,214
18. Boh Bros. Constr. Co., New Orleans, La 168,077

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Sub-base and fill under floor slab	4,450 c. y.	$1.00	$1.51	$0.84
2. Embankment around walls	13,800 c. y.	.60	1.04	.61
3. 1500-lb. concrete in place	2,125 c. y.	12.00	10.24	12.00
4. 2500-lb. concrete in place	925 c. y.	11.00	10.00	11.00
5. 3000-lb. concrete in place	785 c. y	18.00	19.58	29.00
6. 1:14 concrete in place	1,950 c. y.	9.50	7.00	8.00
7. Floor slab-expansion joints	1,680 l. f.	.10	.42	1.25
8. Vertical-wall expansion joints	96 l. f.	1.00	.77	1.52
9. Bar-reinforcing steel	111,500 lb.	.05	.0774	.07
10. Mesh reinforcing steel	390 hund. s.f.	1.00	6.33	4.88
11. 6-in. open joint salt glazed vit. pipe with pit run grav. and sand bkfill	935 l. f.	1.00	1.51	1.29
12. 6-in. cement joint salt glazed vit. pipe, incl. trench and bkfill	65 l. f.	1.00	1.10	1.42
13. 15-in. salt glazed vit. pipe, incl. trench. and bkfill	63 l. f.	3.00	2.40	2.91
14. 24-in. salt glazed vit. pipe incl. trench. and bkfill	20 l. f.	4.00	3.50	5.60
15. 20-in. c. i. pipe, incl. tr. and bkfill	84 l. f.	10.00	9.10	9.90
16. 30-in. c. i. pipe, incl. tr. and bkfill	72 l. f.	20.00	20.27	16.40
17. Cast iron fittings in place	0.61 ton	300.00	194.26	190.00
18. Wooden manhole covers	6 ea.	10.00	12.00	12.50
19. Wooden ladders	4 ea.	15.00	5.00	20.00
20. Ventilators	4 ea.	50.00	26.25	32.00
21. 20-in. gate valve, c. i. valve box	1 ea.	500.00	335.00	360.00

Schedule II—Cast Iron Water Main

LIST OF BIDDERS:

1. Gerald Mora, Houston, Tex. (contract) $137,2
2. F. S. Oldt Co., Dallas, Tex 141,2
3. Williams & Whittle, Dallas, Tex 143,3
4. Glade Construction Co., Fort Worth, Tex 147,0
5. Ben Sira & Co., Dallas, Tex 156,4
6. W. G. Cullum & Co., Dallas, Tex 157,1
7. Ernest Loyd, Cleburne, Tex 159,3
8. Waco Construction Co., Waco, Tex 164,8
9. Uvalde Constr. Co., and P. C. Sorenson, Dallas, Tex. 166,0
10. M. F. Fischer & Son, San Antonio, Tex 168,9
11. Boh Bros. Constr. Co., New Orleans, La 185,3

Item	Quan.	Unit Prices (1)	(2)	
1. 30-in. cast iron pipe, incl. tr. and bkfill	9,350 l. f.	$10.00	$11.00	$1
2. As above, 24-in	2,075 l. f.	8.00	8.50	
3. As above, 20-in	40 l. f.	8.00	7.00	
4. Cast iron fittings, installed	18 ton	300.00	225.00	29
5. 24-in. gate valves, installed	6 ea.	800.00	700.00	69
6. 20-in. gate valves, installed	1 ea.	500.00	450.00	42
7. 12-in. gate valves, installed	2 ea.	150.00	125.00	12
8. 10-in. gate valves, installed	1 ea.	125.00	100.00	9
9. Valve manholes	7 ea.	100.00	225.00	28
10. Cast iron valve boxes, installed	3 ea.	20.00	10.00	
11. Cut-in to exist. 30-in. c. i. water line	Lump Sum	600.00	250.00	17
12. Cut-in to exist. 20-in. line	Lump Sum	600.00	250.00	17
13. Cut-in to exist. 12-in. line	Lump Sum	600.00	300.00	17
14. Cut-in to exist. 10-in. line	Lump Sum	500.00	150.00	6
15. Storm sewer crossing Sta. 6+17	Lump Sum	400.00	300.00	12
16. Storm sewer crossing, Sta. 33+78	Lump Sum	350.00	300.00	17
17. Railroad crossing, Sta. 95+00	Lump Sum	400.00	500.00	12
18. Replace 6-in. conc. base and 2-in. asph. pavmt.	170 s. y.	3.00	3.00	
19. Replace flex. grav. base and asph. pavmt	80 s. y.	2.00	2.00	
20. Replace 6-in. conc. base, 2-in. rock asph. pavmt	1,475 s. y.	3.00	3.00	
21. Replace 6-in. conc. base and 2½-in. vertical fiber brick pavmt	35 s. y.	3.00	4.50	
22. Rock excavation	300 c. y.	20.00	3.50	1
23. Overdepth earth excav., reservoir approach	50 c. y.	1.00	2.00	
24. Lumber ordered left in trenches	2 M bm.	100.00	75.00	2
25. 1:14 conc. cradle and backing	12 c. y.	6.00	15.00	1

HIGHWAY, NEW MEXICO

OWNER: New Mexico State Highway Dept., Santa Fe; B. C. Dwyre, state highway engineer.

PROJECT: Construction of 4.659 miles of roadway located in McKinley County, N. M., on U. S. Highway 66, between Gallup and Fort Wingate, consisting of base course surfacing and double bituminous surface treatment. Also involves removal of old drainage structures, and the obliteration of old road.

CONDITIONS: Contractor to furnish all material and complete work in 75 weather working days. Rail and highway transportation facilities available. Minimum wage rates specified are: skilled labor, 90c. per hour; semi-skilled, 60c.; and common labor, 40c.

BIDS: Four bids were received April 28, 1943, ranging from the contract low of $103,515 to $138,268. Engineer's estimate $108,232.

LIST OF BIDDERS:

1. R. C. Carrico, Albuquerque, N. M. (contract) $103,5
2. Brown Brothers, Albuquerque, N. M 125,3
3. E. M. Silver, Albuquerque, N. M 133,4
4. Skousen Brothers, Albuquerque, N. M 138,2

Item	Quan.	Unit Prices (1)	(2)	
1. Remove old drainage structures	Lump Sum	$400.00	$1,000.00	$6
2. Rolling—steel-tired roller	93 hr.	4.50	6.00	
3. Rolling—sheeps foot roller	307 hr.	5.00	6.00	
4. Base course surf., No. 1 aggregate	18,500 ton	1.55	1.60	
5. Watering	1,106 M gal.	2.50	4.00	
6. Obliterating old road	4.659 mi.	100.00	100.00	10
7. Ballast	32,812 ton	1.05	1.35	
8. Liquid asph. road oil, MC-3	1,172 bbls	5.60	6.00	
9. Cover material	2,232 ton	5.00	6.00	
10. Asphalt	1,120 bbl.	5.60	6.00	
11. Preparation of base course	4.659 mi.	300.00	1,000.00	70

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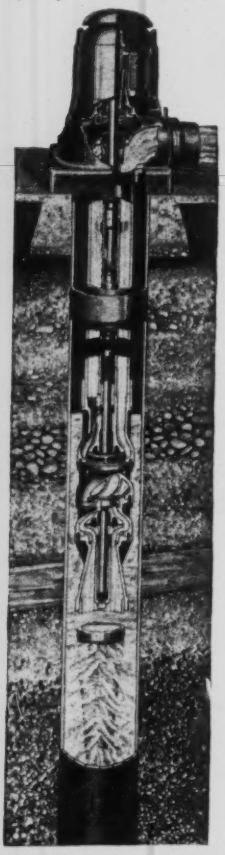

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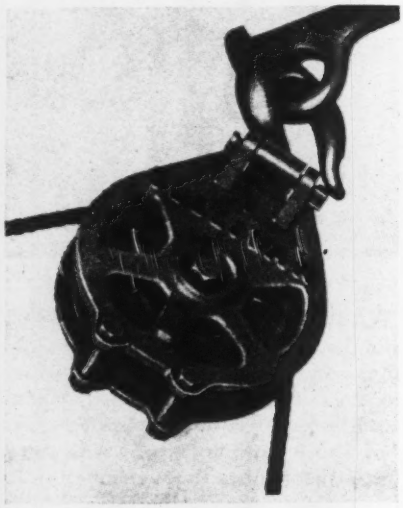
NEW AIDS TO THE CONSTRUCTOR

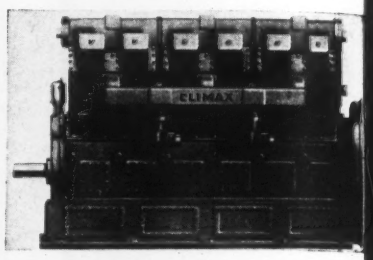
Gypsum Walls and Roofing

Using no metal or other critical material needed in the war effort, there is a new gypsum laminated roof decking designed especially for wartime construction where speed, durability and easy handling are essential. Of light weight—the 2-in. decking weighs only 8 lb. per sq. ft. and the 1½ in. quality only 6 lb.—this material saves on freight, materials and labor by requiring only a light supporting wood frame. Fastened down with common spikes, it saves priority troubles by eliminating clips and metal reinforcing. Twenty square feet of durable, weather-proof, rigid and fire-resistant wall in two minutes—this, it is said, can be accomplished by the use of gypsum exterior board, a new product which comes in large panels, 24 or 48 in. wide and 8, 9, and 10 ft. long. Any carpenter can apply the panels directly to wall studs.—*Certain-teed Products Corp., 120 S. LaSalle St., Chicago, Ill.*



Ball Bearing Sheaves

Scraping requires rugged tail rope sheaves and this manufacturer has developed a special ball bearing sheave for this service. All side covers and sheave wheels are tough alloy steel. Hooks, eyebolts and clevises are forged from alloy steel. An extra wide sheave wheel reduces rope wear. Openings are large enough to pass a square knot of rope. Quick opening snatch block construction gives fast, easy rope change. Greasing is required only once a year.—*Sullivan Machinery Co., Michigan City, Ind.*



New High Speed Engine

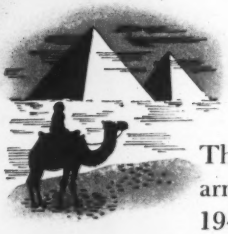
To meet today's demands for a high speed engine which will mesh with modern power consuming machinery for rock or oil drilling, operating large pumps and compressors, driving mining and construction machinery and, with suitable generators, as a low cost means of generating electric power, a new engine has been designed with several unusual design and operating characteristics. Among these features are wide fuel range, economical dual carburetion, dual ignition, maximum turbulence for perfect combustion, high capacity cooling system, and low cost maintenance. For specifications, test data, recommended applications, etc., write to—*Climax Engineering Co., Clinton, Ia.*

Portable Generator

A new portable gasoline driven generator has been produced. The equipment is designed to charge 6, 12, 24-volt batteries at 10 to 300 amp., and consists of a specially designed generator driven by a 6 hp. single cylinder, air cooled, gasoline engine, which is equipped with air cleaner, gasoline filter, magneto, self-starter, rope starter, gas tank and remote stop control. For

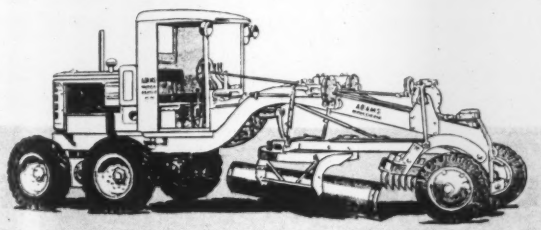
Adams Graders

SAW THE BEGINNING OF THE FIGHT IN AFRICA



The advance of the British army into Abyssinia during 1940-41 marked the start of the allied capture of Africa and, in the words of a South African officer, "Adams Motor Graders operated with the advance troops in preparing roads, camp sites, etc."... To attach these machines to General Cunningham's army and to use them in subsequent campaigns, no miracle of overseas transportation was necessary—these graders were already in Africa—a part of the hundreds of Adams machines imported by African authorities during the past 20 years to help with the constantly expanding African road building program... Valuable in peace, their *availability* made them even more valuable in war!

Throughout the world, in war or peace, Adams machines have filled the bill on the toughest jobs... After Victory it will pay you to investigate their possibilities for efficient, economical operation on your peace-time jobs! J. D. ADAMS COMPANY, *Indianapolis, Ind.*



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Elevating Graders • Hauling Scrapers • Etc.

"SECOND GEAR" or "low gear" for the tough spots

"fluid drive" welding on the straightaway

- **JUST ONE ADJUSTMENT** gives exact welding current desired. No "nuisance gadgets"—exciters, rheostats or reactors.
- **ARCONTROL** gives choice of three types of arc.
- **NO "DROOP"** in welding current when machine warms up. Just pre-set—and *weld!*
- **BUILT TO "TAKE IT"!** Banging can't damage heavy, one-piece seamless steel frame! No tin boxes—all vital parts are *inside*.

Here's new, handy power for those tough jobs—with the same timesaving, rock-steady pre-set current adjustment that only Flexarc welders give you!

It's ARCONTROL. This new welding feature, combined with Westinghouse single, pre-set current adjustment—is just what your operators have always wanted. It provides simple current control—flexible enough to tackle any job.

New ARCONTROL brings you a choice of THREE optional ranges of operation. "Normal" range, like fluid drive, gives you fast, flexible operation that meets most conditions. "A" and "B" ranges, like second and low gear, provide reserve ranges of power for unusually tough conditions.

Speed your operator training by specifying easy-to-operate Westinghouse D-C Welders. Write for complete details. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

J-90470

Westinghouse **FLEXARC WELDERS**

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

for use with the
UNIONMELT*
PROCESS

HY THE MAJORITY OF
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estinghouse A-C Welders

Westinghouse transformer equipment specially designed for use with the Unionmelt welding head.

Control and transformer are combined in the compact 1000-ampere welder.

Built-in power-factor correction reduces power demands.

Single pre-set current control speeds adjustment—simplifies operation.

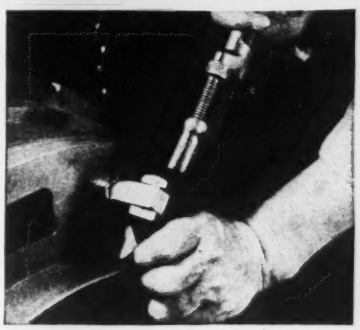
Natural air cooling eliminates fans.

The Unionmelt Welding Process is the fastest known method of making butt, fillet, and plug welds—up to 20 times faster than any other method. Working together, Unionmelt equipment and Westinghouse A-C Welders form a team that will give you faster continuous production at a new low cost. Write for full details—ask for Booklet B-3090. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania. J-90470

*Unionmelt is the registered trade-mark of The Linde Air Products Co.

Westinghouse
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

easy portability, the entire unit is mounted on a skid-type base, equipped with 5-in. wheels. When the unit is in use the wheels are raised from the ground, thus preventing creeping.—*Hunter-Hartman Corp., St. Louis, Mo.*



Heavy Duty Extractors

These double purpose extractors are of forged tool steel with heavy square shank followed by a sharply tapered, short, reverse thread ending in a square reaming end. Simply by inserting the tapered end in the stub of pipe, tube or drill screw or bolt, without any hammering or other preparatory steps, a powerful four-point grip is obtained. It is emphasized that this shallow multiple bite greatly lessens any expansion and jamming. The built-in, square reamer automatically removes burrs. Ten cadmium plated extractors make up the set and cover a wide range of pipe sizes.—*Reps Tool Co., Inc., 99 Wall St., New York, N. Y.*

Turbine Pump Bowls

There has recently been designed and developed a line of high capacity vertical turbine pump bowls. These bowls are intended primarily for pumping water from flowing streams or lakes, but may be used in large diameter wells for industrial or municipal water supplies.

This new line of bowls includes designs for capacities up to 16,000 gpm., and all bowls are true turbine type. Noteworthy features are the unusually high efficiencies throughout a wide capacity range and the non-overloading type impellers used. These features make the new bowls especially desirable for pumping from rivers or streams where fluctuating water levels are encountered, with consequent variation in capacities and pumping heads.—*Layne & Bowler, Inc., Memphis, Tenn.*

Compressor for Diving

A new compressor has been developed to be used for marine diving. It has an overhead air tank, used as aftercooler and to assist in moisture and oil separation. It is built for six divers working independently of one another, and possibly working under different pressures. These units are of particular interest to navy yards, salvage companies, and all concerns having to do with waterfront operations.—*Schramm, Inc., West Chester, Pa.*

New Plastic Drill

Claimed to be fourteen percent lighter in weight, a new ¼-in. capacity electric drill has been announced. Armored in plastic construction, featuring double protection of the operating parts within an inner metal skeleton frame that is covered by entirely separate plastic housings, this new drill provides fast drilling because it is lighter and easier to handle. The drill can be adapted to all types of heavy-duty production service.—*Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill.*

Wood Truck Wheels

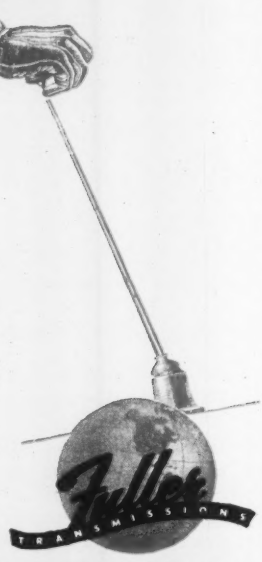
Made of wedges of finely selected hard, kiln-dried maple, these truck wheels are made in sizes from 2½ to 20 in. in diameter to replace present wheels. This wheel is not a mere substitute for rubber. It is said to last longer, roll easier and be sufficiently quiet and shock-absorbing for most purposes. It is chemically treated and spark-proof.—*Metzgar Co., Grand Rapids, Mich.*

Melting Kettles

Construction kettles that burn kerosene or light furnace oil are designed for municipal, county and state highway maintenance, paving contractors, roofers, waterproofers and industrial plants. The manufacturer claims that they save fuel because kerosene or fuel oil is cheaper than wood and because the burners utilize all the heat units in the fuel. They save time because the kettle can be put into operation in five minutes and because it melts material in one-third the

SINGLE RESPONSIBILITY

Every step in building a Fuller Transmission is handled in Fuller's own plant . . . forging, gear cutting, precision gear mating, assembling and testing . . . that's why you'll find the name *Fuller* stamped on all genuine Fuller gears. Look for the name . . . it is your assurance of a smooth running gear . . . and, of course, smooth running means more wear life, less need for service and parts replacements.



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DRILLING
ANYWHERE

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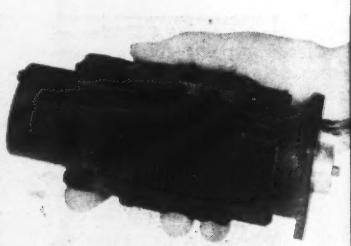
PITTSBURGH, PA.

time required by a wood [illegible] It saves labor because the [illegible] very little attention after [illegible] started.—*Hauck Mfg. Co., [illegible] St., Brooklyn, N. Y.*

Relay Test Switches

A new electrical testing unit has been developed which combines a relay and knife blade test switches and permits maximum flexibility in maintenance and testing. Standard relay elements mounted on a removable unit chassis are used in these units, which are designed for panel mounting. Test connections can be made either by clip leads or test plugs. The test switches are of high capacity, self-aligning knife blade construction with a movable blade and hinge jaw mounted on a molded block rigidly fastened to the case. Each circuit can be identified by cards on the switch handle, and a red handle identifies the trip circuit. Cases are available in three sizes, with a metal cover and transparent window for visual inspection of elements and observation of relay targets.—*Westinghouse Electric & Mfg. Co., Department 7-N-20, East Pittsburgh, Pa.*



Remote Control Motors

The application of electric motors to remote control devices has usually met with two stumbling blocks: First, a motor has a tendency to coast or override

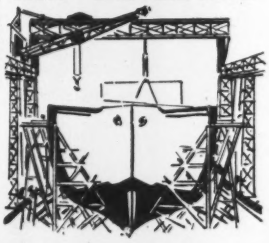
WANTED: More Wire Rope
FOR ESSENTIAL WAR WORK

OIL INDUSTRY

LOGGING

MANUFACTURING

SHIP BUILDING



Every Wire Rope User Can Help

YOUR wire rope is production equipment . . . a moving part subject to the same factors of wear and tear as that of any other operating machinery.

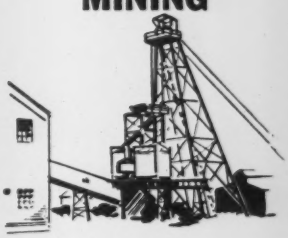
The selection of the correct grade, size and type of wire rope . . . proper installation and equipment . . . consistent maintenance procedures—all will contribute to longer life thereby releasing more wire rope for the immediate Victory Cause . . . a patriotic and profitable measure every wire rope user can employ.

May we send you a copy of "Practical Information on the Use and Care of Wire Rope"?—no obligation.

The day after day performance record of "HERCULES" (Red-Strand) Wire Rope is demonstrating that it has what it takes to meet 1943 conditions. In "HERCULES" there is a "right" rope for every heavy duty purpose, as it is furnished in both Round Strand and Flattened Strand constructions—all of which are available in either the Standard or Preformed type.

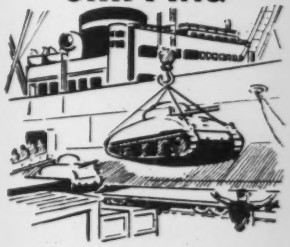
CONSTRUCTION

MINING



WAR MACHINES

SHIPPING



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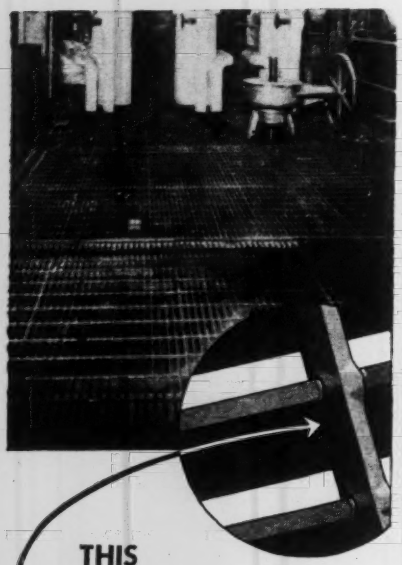

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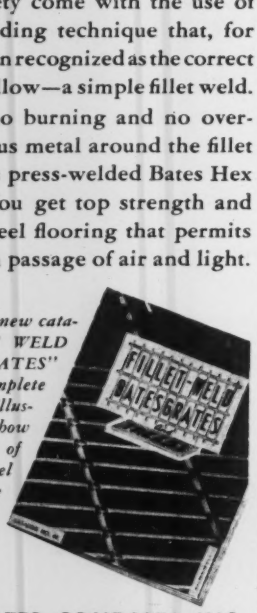
OPEN STEEL FLOORING
GIVES THE
COMBINATION OF SAFETY AND CLEANLINESS
YOU WANT IN OPEN STEEL FLOORING

This extra cleanliness and safety come with the use of welding technique that, for years, has been recognized as the correct method to follow—a simple fillet weld.

There is no burning and no overflow of surplus metal around the fillet into which is press-welded Bates Hex Bar Stock. You get top strength and rigidity in steel flooring that permits the maximum passage of air and light.

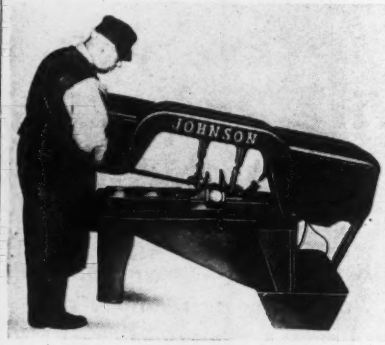
Write for the new catalog "FILLET WELD BATES - GRATES" that gives complete details—well illustrated to show how advantages of this open steel flooring can be used in your plant.



WALTER BATES COMPANY, INC.
JOLIET, ILLINOIS
OPEN STEEL FLOORING • STAIR TREADS

making exact control impossible. Second, electric motors have usually meant excessive weight for most applications.

Both these objections, it is claimed, are overcome with the new lightweight motors developed and produced by this manufacturer. Wherever instantaneous braking is desired, this new patented clutch will be found very useful.—*Lear Avia, Inc., Piqua, Ohio.*



Metal Saw

For work requiring ultra high-speed cutting, it is claimed that this new model saw offers many valuable features. The pump is of the non-clogging piston-type, driven by a noiseless cam. It is mounted in the frame without impairing overall streamlining of the machine. Power is taken from the present drive gear, eliminating the necessity for a separator motor. Ingenious power take-off eliminates special wiring and extra switches. The speed of the pump is automatically regulated by the speed of the machine, and the flow of coolant is in direct relation to the speed of the blade. In wet cutting, the flow of the coolant is in direct relation to the blade speed and the pump automatically stops and starts the machine. If dry cutting is desired, the pump can be readily disconnected.—*Johnson Mfg. Corp., Albion, Mich.*

Tractor Grip Lugs

With this new appliance, it is claimed that it is unnecessary to tear down the track assembly and replace the worn grouser-shoes with new parts, because a simple repair operation will restore the gripping power of the track. This is accomplished merely by welding on to the old grouser-shoe a specially designed steel bar with a groove and bevel to facilitate laying the welding bead along the edge which holds the bar and the grouser-shoe together as in a vise. The material is a special hardening steel, which it is claimed gets harder and tougher with use and often outlasts the original grouser. Over 80 percent of the metal of the old shoe is thus salvaged, it is reported, releasing that much critical metal. Meanwhile, the contractor

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s metal-muscled rock drill worked acArthur's engineers, "down under" camps and bases were clawed out wilderness overnight.

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Blue Brute Compressors, too . . . portable and semi-portable, gasoline, Diesel, and electric-driven . . . will save you time and good hard cash. Their "throats", smoothed by time-tested Feather Valves* . . . *deliver more air* for less money under toughest service conditions.

Ask for a Blue Brute air-power team, best for your money. Get a demonstration now, on your present job!

U. S. Pat. Off. ‡Blue Brute Compressors and Air Tools are painted olive drab for the Army and up gray for the Navy until Victory.

Behind the Fighting Fronts with

BLUE BRUTES

Blue Brutes today support the fighting front in Tunisia, just as they helped the British 8th Army turn back Rommel from the Nile. In the U. S., they provide air power for thousands of industrial operations, as well as construction projects, in Navy Yards, Army Camps, Air Bases and Ordnance Plants throughout the country. Your nearest distributor is listed on page 106.

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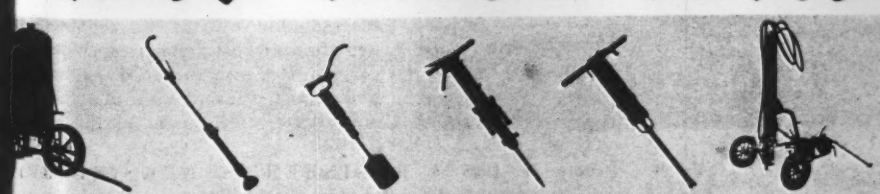

ors from 60 to 500 cu. ft. capacity in mount- t all jobs. Rock Drills and Air Tools that have always set the pace for easy operation — available in a wide range of weights and sizes.

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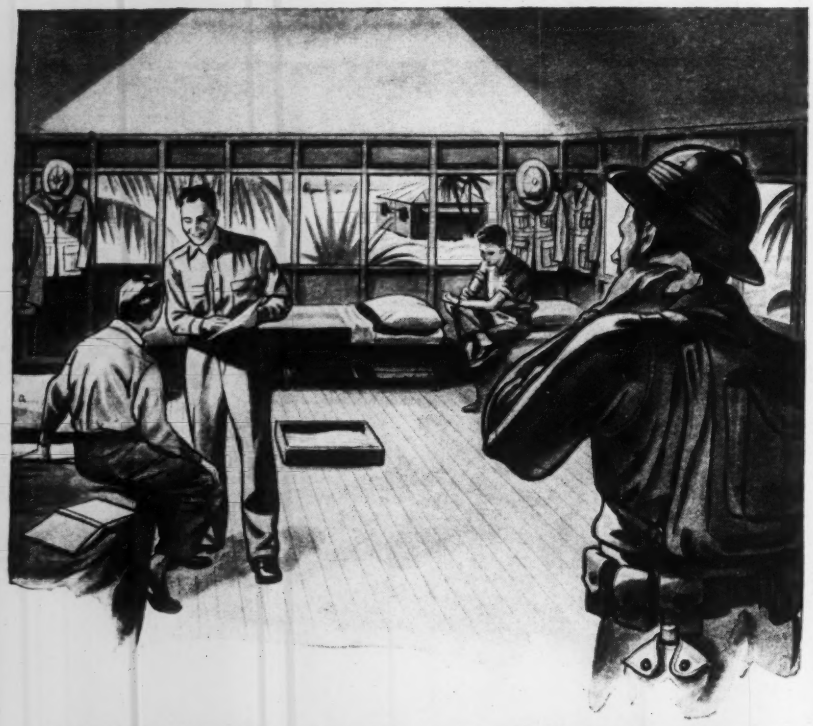
Worthington Pump and Machinery Corporation, Harrison, N. J. Holyoke Compressor and Air Tool Department, Holyoke, Massachusetts



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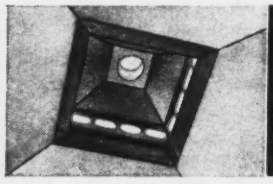
In summer as in winter, from the South Pacific Islands to North Africa, Victory Huts and Homes contribute vitally to victorious war—housing our fighting forces and war workers *well, efficiently* and *economically*.

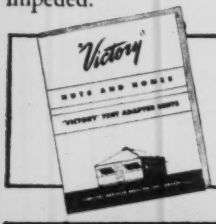
Consider Air-Space insulation, so important in the hot months ahead—*uniquely* designed and built into all Victory Huts and Homes. In summer, cooling air circulates freely; in winter, the same space provides insulation against cold, but ventilation is not impeded.

This is but one feature of Victory Huts and Homes, *now* available to the armed forces and war-working industries.* Fully pre-fabricated, demountable and portable, quickly erected at low cost, they answer *your* housing problem.

* *Subject to government regulations.*



View of ventilator and openings of the Air Spaces in the double insulated roof.



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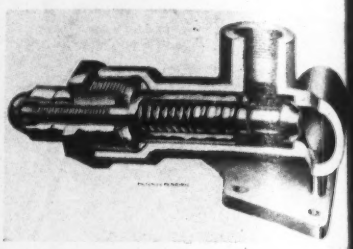
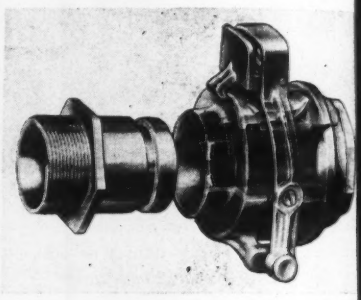
MAKERS OF "VICTORY" HUTS AND "VICTORY" HOMES

can put his tractor back in good condition at considerably less replacement cost and without delay.—*Allied Steel Products, Inc., Cleveland, Ohio.*



Self-stabilizing Relief Valve

This valve, it is said, embodies improvements some of which are entirely new. It is particularly adapted for use in fuel and lubrication lines and in hydraulic systems where excessive pressures may occur. The design is such that variations in pump speed cause no fluctuation in gage pressure, which remains constant under all conditions, preventing weave and chatter.—*The Merit Engineering Inc., 40 Clifford St., Providence, R. I.*



Quick Disconnect Couplings

Because of instantaneous release, it is claimed much time is saved by the use of this coupling, enabling men to do liquid moving jobs many times faster than by former methods. Industrial and marine couplings from 2 in. to 10 in. in size are disengaged by releasing a latch and throwing a lever. Connection is made by placing the two ends of the coupling together and raising the lever. There are no bolts to tighten, no threads to match, no tools to use.—*Wiggins Quick Disconnect Coupling Division, E. B. Wiggins Oil Tool C., Inc., 3424 East Olympic Boulevard, Los Angeles, Calif.*

Coloring Concrete Floors

Realizing the demand for a penetrating concrete hardener which would eliminate the need of etching to neutralize the alkaline content of concrete, yet penetrate and carry color deep into the cement, the manufacturers announce a new color hardener now available in several attractive colors and clear. In using

Watch those Grooves

...if you want your wire rope to last

GROOVES that are too wide do not give proper side support, causing a flattened rope. If the grooves are too narrow they will pinch the rope, with resultant rapid wear. In each case the distorted rope is not free to adjust itself so that each strand carries its own share of the load. Not even a quality rope like U·S·S American Tiger Brand will last as long as it should under such conditions.

Make it a point to adhere to recommended tolerances for groove diameters. Check your sheave and drum grooves frequently to see that they are in good condition. Be sure that grooves are smooth and that sheaves with broken flanges are replaced before they can cause damage. Only by giving your rope such care and attention can you get the *maximum* service that is a war-time must today.

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
COLUMBIA STEEL COMPANY
San Francisco
United States Steel Export Company, New York

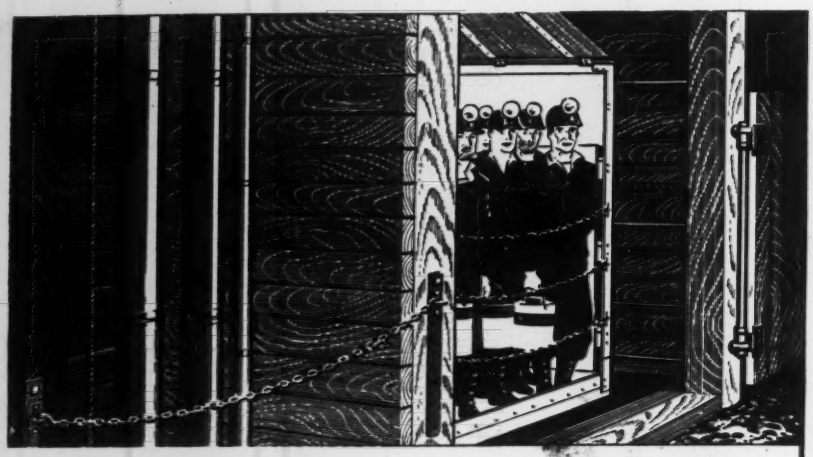
Here's a book you need right now

Every user of wire rope can get a lot of good ideas from this free book. It's packed with easy-to-follow instructions, 48 pages of practical hints that will help avoid the common errors of handling and care which shorten rope life. Order as many copies as you need and get them into the hands of the right men.

USS

Excellay Preformed

UNITED STATES STEEL



WOOD Installed Years Ago is Helping the War Effort

A MINE SHAFT carries a lot of traffic. Through it travel the manhoist, skips and counterweights, plus piping and conduit, the manway and ventilating shaft. Construction has to be true, sturdy and dependable, in the face of conditions that are unusually severe—a lot of moisture is present, and exhaust air may carry fungus-forming spores.

WOLMANIZED LUMBER* has been widely used for this important construction as shaft timbers, planking and guides, in trestles and head frames, and as ties. The fact that it performs so well, under these adverse conditions, explains why service records on Wolmanized Lumber make such interesting reading.

PROLONGED LIFE of this treated wood greatly reduces the labor required for maintenance. Thus, the millions of feet of Wolmanized Lumber used throughout industry generally, for years past, are now helping to ease the manpower situation. New materials can go into other vital construction, and the money saved can help the war effort.

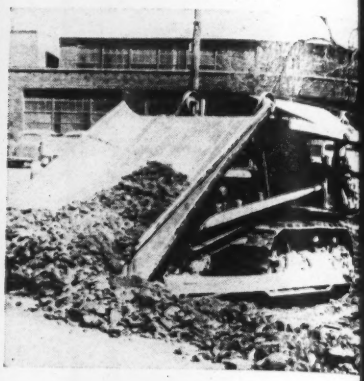
WOLMANIZED LUMBER is ordinary wood, "alloyed for endurance". Vacuum-pressure impregnation with Wolman Salts* preservative makes it highly resistant to decay and termite attack. In using it, you retain all of the advantages of working with wood—ease of handling and erection, light weight, strength, resilience, high insulating value. American Lumber & Treating Company, 1649 McCormick Building, Chicago, Illinois.

*Registered Trade Mark

"Alloyed" FOR ENDURANCE

WOLMANIZED LUMBER

this material in colors the hardener is the desired color is first applied and allowed to dry from one to two hours; this is followed by a finish coat of special coating. If an enamel finish is required this finish coat is of the same color as the first coat. The coverage should range between 250 and 400 sq.ft. per gal., depending on the surface.—*The Wilbur & Williams Co., Park Square Building, Boston, Mass.*



Mobiloader

This manufacturer announces an improved model loader which operates with a Caterpillar Diesel D4 tractor. There are numerous improvements, it is said, over preceding models. The new model, it is claimed, has increased stability, greater operating range, reduced height to simplify transportation, and lower center of gravity. It has a bucket capacity of 1⅛ cu.yd.—*Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill.*

Asbestos-Cement Locker

A newly designed locker on the market is made of asbestos-cement flat sheathing. This material is said to provide the best substitute for metal since it is produced by combining selected portland cement and asbestos fibres under tremendous pressure, resulting in a stone-like substance which will not rust, rot or corrode, and it is fire and rodent-proof.—*The Philip Carey Mfg. Co., Lockland, Cincinnati, Ohio.*

Fork Extension Adaptors

The problem of handling loads of widely varying dimensions on a lift truck with standard length forks has been considerably simplified by new fork extension adaptors. Quickly and easily attached, the adaptor makes it possible to extend fork lengths safely as much as 24 in. in only 15 or 20 seconds. Thus skids or pallets need not conform to a minimum size range to be efficiently accommodated by the same lift truck.—*Towmotor Corp., Cleveland, Ohio.*

Now that Steel is a "Precious Metal"

—make it LAST!

Your metal is *war* metal—"precious metal" to all of US.

Whether it's a storage tank as pictured above, a bridge, a pipeline, a crane or what—don't let rust sabotage it.

As one contractor's superintendent says:

"We are painting equipment now that we never bothered to paint before. For instance a concrete mixer used to get a cleaning, then possibly a coat of oil—but now we do a real paint job on them."

Remember, if it's metal it's worth protecting—and "first choice for making metal *last*" is Dutch Boy Red Lead. No better rust preventative exists. Its top-notch corrosion-fighting ability is a result of intensive research, coupled with years of practical experience in the field.

Three forms are available—paste, liquid and quick-drying. All are made with highly oxidized red lead having a true red lead (Pb_3O_4) content of more than 97% and extremely fine particle size. The result is a smooth, tough protective film that clings tight and is extra-resistant to weather, smoke, dampness, sulphurous gases, salt water and other enemies of metal.

The quick-drying form of Dutch Boy Red Lead is invaluable where allowable drying time is short. There are two types. One dries for recoating in 4 to 6 hours, the other for recoating the next day.

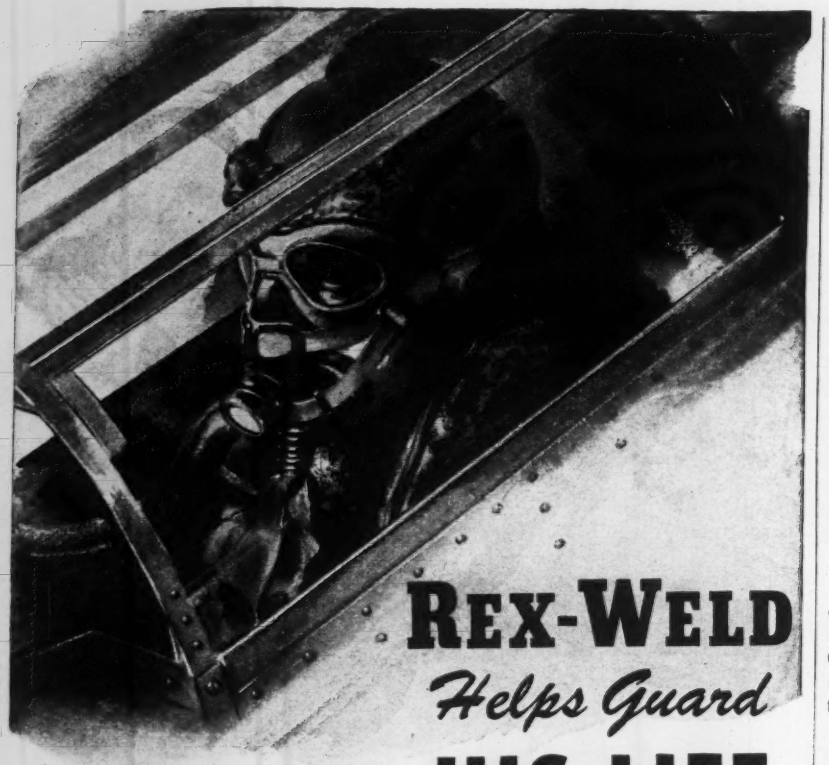
In practically every industry Dutch Boy Red Lead is keeping metals in fighting trim—keeping Uncle Sam's production line unbroken.

☆ ☆ ☆

NATIONAL LEAD COMPANY: New York, Buffalo, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco, Boston (National-Boston Lead Co.), Pittsburgh (National Lead & Oil Co. of Penna.), Philadelphia (John T. Lewis & Bros. Co.)

DUTCH BOY RED LEAD

FIRST choice for making metal LAST



REX-WELD
Helps Guard
HIS LIFE

REX-WELD Flexible Metal Hose has met the critical test that demands only the best materials for our combat planes. More and more bombers, fighters and interceptor-pursuit ships are being Rex-Weld equipped.

REX-WELD's war service is not confined to the planes themselves. In the steel mills and munition factories, on the production and assembly lines, everywhere that war-worthy flexible connections are needed, REX-WELD is rendering vital service.

There are specific reasons for this. REX-WELD is a specially constructed flexible metal tubing. It is fabricated from strip metal by a precision autogenous welding process that produces uniform, stronger wall structure plus extreme flexibility. REX-WELD stands up under high pressures, high and low temperatures, extreme contraction and expansion. It is seep-proof to gas, water, oil, air and searching fluids.

Type RW-81
(annular corrugations)

Type RW-91
(helical corrugations)

Available in continuous lengths to 50 ft. Both Steel and Bronze. 3/16" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F.

Write for Engineering Recommendations

CHICAGO METAL HOSE CORPORATION

General Offices: MAYWOOD, ILLINOIS

Factories: Maywood and Elgin, Illinois

MANUFACTURERS' ACTIVITIES

CATERPILLAR TRACTOR Co., Peoria, Ill., has been awarded the Army-Navy "E" symbol for outstanding achievement in the production of war material. A presentation of the "E" flag was made at the plant recently. Brig. Gen. J. McCoach, Jr., assistant chief of engineers, and Captain E. A. Lofquist, chief of staff of the Ninth Naval District, made the award. An individual "E" pin was given each employee, signifying his outstanding contribution to the war effort.

APPOINTMENT of A. N. Morton as production manager of the Mack Co.'s three huge plants has been announced by Charles T. Ruhf, president of Mack Mfg. Corp., and executive vice-president of the parent company, Mack Trucks, Inc.

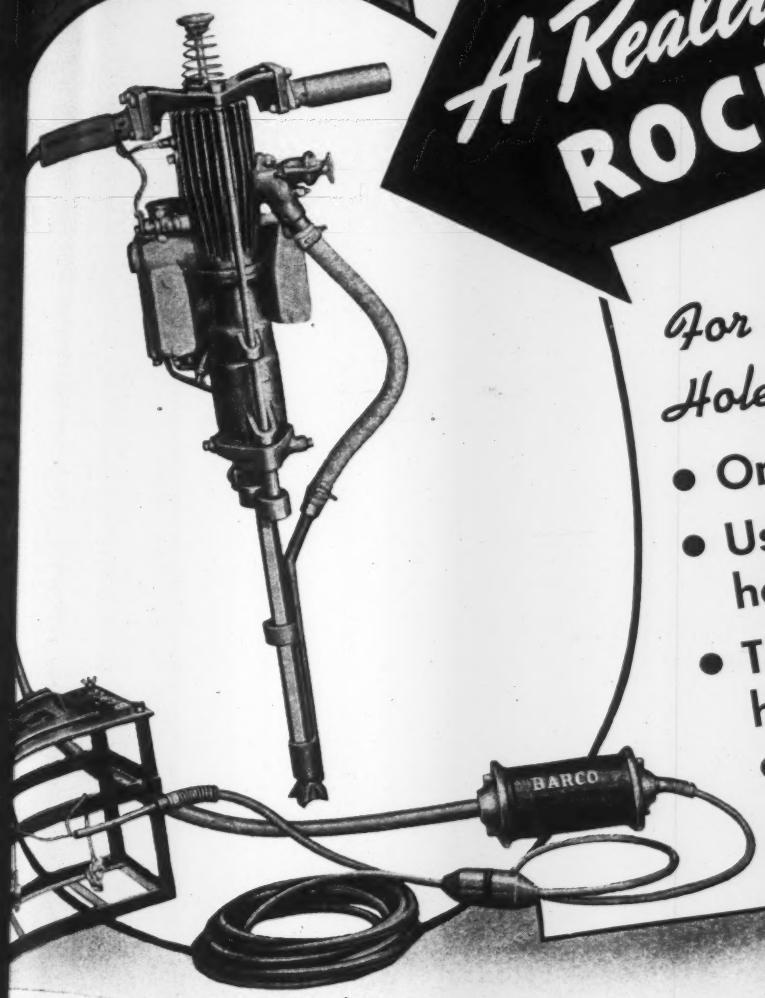
PRESIDENT CHARLES R. HOOK, of the American Rolling Mill Co., Middletown, Ohio, has announced the election of Frederick V. Geir, president of the Cincinnati Milling Machine Co., as a director.

THE JOHNSTON & JENNINGS Co., Cleveland, Ohio, manufacturer of tank fittings and industrial stokers, has purchased the exclusive manufacturing and sales rights of an electrical process for preventing rusting of water tanks, piping and similar steel structures which has been tested and approved by the American Water Work Association, and is said to have won high commendation from users in both municipal and industrial fields.

WESTON G. FROME has been appointed assistant general manager of the Explosives Department of Atlas Powder Co., Wilmington, Del. Mr. Frome was general manager of Atlas Powder Co.'s Giant Division of San Francisco, Cal., and has had long experience in the explosives industry, both in operating and sales divisions.

THE BESSER MFG. Co. of Alpena, Mich., recently sponsored a dinner in Washington which was attended by about 40 representatives of concrete block manufacturers in several South Atlantic States and also by representatives of seven foreign governments and of several United States government agencies, all of which were interested in building construction and housing. It is reported that last year in this country alone about

A Really Portable ROCK DRILL...



For Surface Drilling
Holes up to 3 feet deep

- One man operates.
- Uses exhaust to clean holes.
- Takes standard 1 inch hexagon drill rods and detachable bits.

RITE FOR
ALOG 606

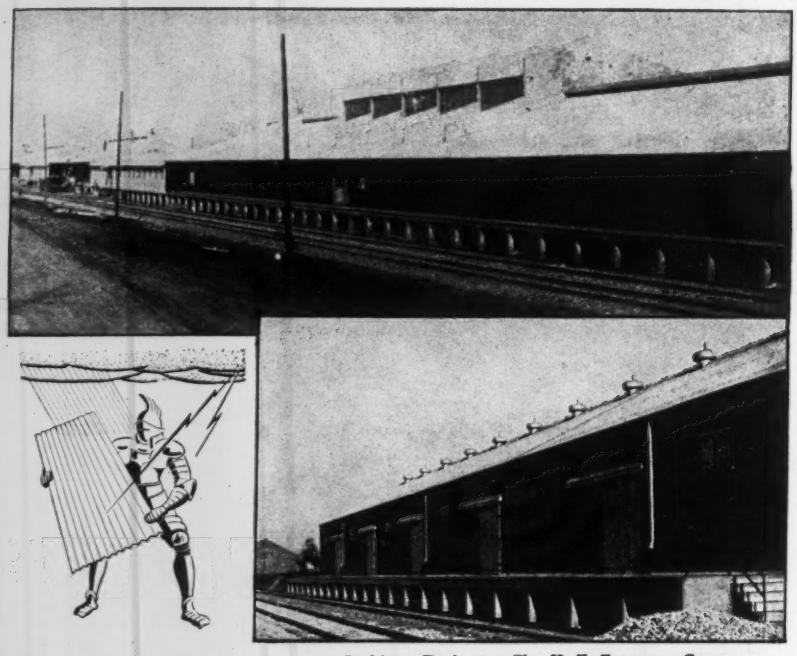
The New Barco Model J-2A Driller
WITH EXHAUST BLOWER

This latest addition to the line of BARCO Portable Gasoline Hammers provides a new and economical method for handling the small, scattered rock excavation jobs which occur so frequently and which have been so expensive and troublesome in the past.

•

BARCO MANUFACTURING CO. NOT INC.
1814 Winnemac Ave., Chicago, Ill.

BARCO *Portable* GASOLINE HAMMER



Architect Engineer: The H. K. Ferguson Co.
Contractor: The Ferguson-Oman Co.

UNCLE SAM gets BOTH

FIRE and WEATHER PROTECTION

with Careystone

CORRUGATED ROOFING AND SIDING

• Many ammunition storage and shipping buildings of important ordnance plants are roofed with Careystone Corrugated—an asbestos-cement material that defies both fire and weather—a product ideally suited to the hazards inherent in the production and handling of high explosives.

• Careystone Corrugated Roofing is strong and rigid, and not subject to appreciable wear. It is relatively reasonable in cost and the large sheets are rapidly applied, effecting a saving in labor. When desired for temporary structures, its strength allows dismantling with little or no breakage and re-using in other locations.

• While practically the entire production of Careystone Corrugated is now going into war construction, its outstanding qualities merit first consideration by industry when peace comes. Further information and specifications will be sent on request. For details, address Dept. 30.

THE PHILIP CAREY MFG. COMPANY—Lockland, Cincinnati, Ohio

Dependable Products Since 1873

In Canada: **The Philip Carey Co., Ltd.** *Office and Factory:* **Lennoxville, P. Q.**

500,000,000 concrete masonry units were made on Besser machines for use in United States government war building construction.

V. W. FARRIS, formerly general manager of Kieley & Mueller, Inc., and formerly a specialist in the instrument business of Manning, Maxwell & Moore, Inc., has organized a group to be known as the Farris Engineering Co. The new company now located at Ridgefield, N. J., is manufacturing equipment for the Navy Maritime Commission and other war work, its specialty being pressure reducing valves, valves for high pressures and temperatures and for salt and fresh water service.

THE 17,000 EMPLOYEES of Caterpillar Tractor Co., Peoria, Ill., set a new company safety record during March of this year with a frequency rate of only 4.1 lost-time accident cases per million man hours of work. Caterpillar employees have also been honored with the Liberty Bell safety award in recognition of their record breaking plant safety frequency rate of 10.3 set during the year 1942.

AMERICAN BRAKE SHOE & FOUNDRY Co., 230 Park Ave., New York, N. Y., has shortened its name to the American Brake Shoe Co. The company has 50 plants serving industry and transportation.

THE CHAIN BELT CO., of Milwaukee, Wis., has announced the appointment of R. A. Corbett as Minneapolis district manager. Mr. Corbett, a graduate engineer, has a background of 25 years of experience with the Chain Belt Co.

THE NEW FOUNDRY of the American Rolling Mill Co. has been opened at Middletown, Ohio. The equipment includes the largest bell-type annealing furnace yet constructed. It will handle castings weighing up to 260,000 pounds. The new plant was constructed with Defense Plant Corporation funds and will be operated under lease to Armco.

THE EXECUTIVE and contracting offices of the Caine Steel Co. are now located at 29 So. LaSalle St., Chicago, Ill. The company is a distributor for manufacturers of corrugated steel sheet piling.

R. H. V. SMITH has been appointed sales manager of the Portland Cement Assn., with headquarters at 10 High St., Boston, Mass. His district includes southern New England.

BUENSOD-STACEY AIR CONDITIONING, INC., has changed its corporate name to Buen-

FREEDOM IS NOT FREE—IT IS PRICELESS ★ *BUY WAR BONDS*

REPORTING FOR DUTY

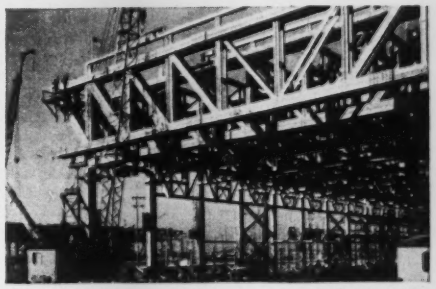
Up from the log pond into the sawmill. Wood is contributing to victory on every fighting front. At home, lumber prefabricated under the TECO Connector System of timber engineering has replaced metal in thousands of heavy war structures such as the aircraft assembly plant shown above. Engineered timber is destined to play a leading role in the reconstruction era to come. You, also, can design in timber with TECO—for strength, durability, and economy. Write today for our literature.

TIMBER ENGINEERING COMPANY

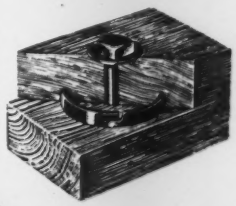
NATIONAL MANUFACTURERS OF ***TECO*** *TIMBER CONNECTORS AND TOOLS*

WASHINGTON, D. C. **PORTLAND, OREGON**

27,000,000 Feet of Lumber



Giant, engineered timber trusses of the world's largest timber-built factory, designed by The Austin Company, of Chicago, engineers and builders.



The ***TECO*** Ring Connector spreads the load on a timber joint over practically the entire cross-section of the woods . . . brings the full structural strength of lumber into play.

WOOD GOES TO WAR — An MGM Technicolor short by James A. Fitzpatrick. Ask your theater when you can see it.

Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers, or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.

ROGERS
LOW BED-
-HEAVY DUTY
TRAILERS

ROGERS BROTHERS CORP., ALBION, PENNA.

DE LAVAL STEAM TURBINE CO.
TRENTON, N.J.

Manufacturers of

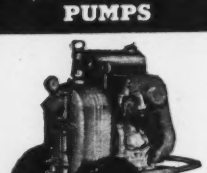
STEAM TURBINES . . . HELICAL and WORM GEARS . . . PUMPS: Centrifugal, Propeller, Clogless, Mixed Flow, Rotary Oil . . . Pump Priming Systems . . . CENTRIFUGAL BLOWERS and COMPRESSORS.

STERLING QUALITY

YOU'LL GET BETTER RESULTS WITH STERLING

WRITE FOR LITERATURE

STERLING PUMPS



STERLING MACHINERY CORP.
405-13 Southwest Blvd., Kansas City, Mo.

sod-Stacey, Inc. For the last two years on account of the war restrictions on air conditioning this corporation has done a considerable amount of heating, power plant and process piping, and this led to the decision that the company discontinue permanently the heating business as well as air conditioning and ventilation. C. A. Dornheim is vice president of the organization for the execution of heating contracts. The offices of the company are at 60 East 42nd St., New York, N. Y.

A GROUP OF KEY men associated with the Federal-American Cement Tile Co. for over 25 years have formed a new company called the Cement Tile Corporation, 608 So. Dearborn St., Chicago, Ill. The officers are C. S. Freund, president; L. J. Wilhartz, vice president; I. Isherwood, secretary and sales manager; V. E. Baird, treasurer and chief engineer; and O. R. Pritchett, assistant secretary and plant manager. The company manufactures slabs for application on steel, wood or concrete supports for industrial, institutional and other types of public buildings.

CLAUDE E. MATTHEWS has been promoted to the position of supervisor of service and parts for the Athey Truss Wheel Co. of Chicago. Mr. Matthews has been with the company since 1937 when he started as a factory serviceman. He has had a broad contact with distributors of Athey Caterpillars. Mr. Matthews has had some experience with the U. S. Engineer Corps as an inspector in dredging work in the Great Lakes. His experience with earth moving equipment is being put to good use in the production of technical manuals for the various military services who are using Athey products.

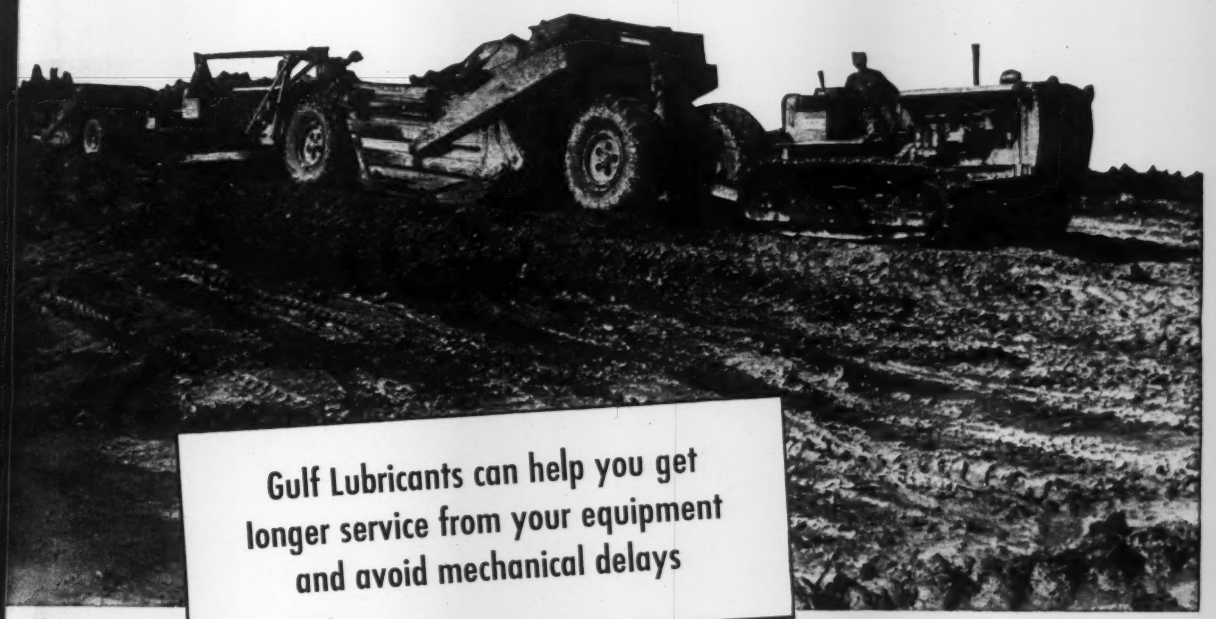
HIGH TRIBUTE was recently paid to the H. O. Penn Machinery Co., Inc., of New York, by the Caterpillar Tractor Co., Peoria, Ill. An engrossed sheepskin presented to Hamilton O. Penn in the form of a "Certificate of Distinction" proclaimed that his company had achieved the top ranking position as the leading distributor of Caterpillar tractors the world over for the year 1942.

WALTER J. DREVES has been appointed vice president and comptroller of the Elastic Stop Nut Corporation, of Union, N. J. Mr. Dreves has been factory comptroller for Sears, Roebuck & Co., Chicago.

Mud, dust, or sand . . . hot or cold

Gulf Quality Lubricants provide

greater protection against excessive wear



Gulf Lubricants can help you get longer service from your equipment and avoid mechanical delays

"All-weather protection with Gulf quality lubricants played a big part in our finishing up months ahead of schedule," says the contractor on this large airport project. "In spite of widely varying operating conditions as the job progressed, our equipment made an outstanding efficiency record and we experienced no failures of lubricated parts."

With spare parts and new units so difficult to obtain, breakdowns of key equipment on the job are a serious matter. So proper lubrication—always a big dividend payer to contractors—is now a vital requirement for keeping up to contract schedule.

Here's how to play safe on your next job: Call in a Gulf Service Engineer and ask him to recommend the best lubrication for your equipment. From Gulf's complete line, he will prescribe oils and greases exactly suited to your requirements—tough and stable oils and greases that stand up and provide better protection against excessive wear under every operating condition. This kind of lubrication will insure more efficient service from every unit, a minimum of operating delays, and lower maintenance costs.

The services of a Gulf Engineer—and the Gulf line of more than 400 quality lubricants—are available to you throughout 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

GULF

GULF OIL CORPORATION
GULF REFINING COMPANY, PITTSBURGH, PA.

To Men Who Plan *for the Future*

-THESE SIMPLE FACTS ABOUT STEEL:

Republic

STEELS AND S

THOSE post-war structures taking shape in your minds and on your boards. Are you thinking of w they can be transformed from ideas into actuali-s—and the materials to employ? Are you preparing ecifications as you plan?

Many are the materials from which you may choose—me new—some talked of as being revolutionary. t, regardless, each has definite qualities that may ake it highly desirable for certain applications, but ossibly not for others.

hat is why STEEL is outstanding as a basic building aterial. *It provides a combination of qualities found in other material.* Even in structures in which other aterials may predominate, steel usually is essential to eir success.

hese features of steel are more than claims. Each has ny years of proof behind it.

el is strong, tough, stiff, safe.

s high in strength to weight ratio—permitting eduction in bulk—saving space.

will not warp or shrink.

s fireproof, vermin proof, splinter proof.

esists heat and cold, wear, corrosion and oxidation.

s sanitary and clean.

rovides a stable base for finishes—metallic, vit-eous enameled or various colored surface coatings.

provides, in stainless form, an attractive, lustrous, ilvery finish.

—is easy to fabricate both by shop and job methods.

—is inherently long in life with little need for maintenance.

—is low in cost per year of service life.

—is available in a wider range of forms than probably any other material.

Before the war interfered with the progress of the building industry, Republic already was the producer of the most complete line of steels and steel building products made by any single manufacturer. Unusually heavy wartime demand for fighting steels, however, has curtailed the flow of many of these products for the duration.

But even as you are thinking of the structures of the future, so, too, are Republic metallurgists and engineers thinking of better steels to help you build them.

Out of Republic's intensive research are coming many new developments. From wartime experience is coming new knowledge of steels. These are being combined with Republic's wealth of "know-how" acquired during years of contact with the building industry to provide you with finer steels than ever before—steels to meet your every demand.

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

SEE SWEET'S FILE

or write us for detailed information on these Republic Steel Building Products:

Pipe—Steel, Copper-Bearing Steel, Toncan Iron
Sheets—Steel, Copper-Bearing Steel, Toncan Iron
Roofing—Steel, Copper-Bearing Steel, Toncan Iron
Enduro Stainless Steel
Toncan Enameling Iron
Taylor Roofing Ternes
Electrunite Steeltubes (E.M.T.)
Fretz-Moon Rigid Steel Conduit
Steel Shingles . .. Steel Siding
Upson Bolts, Nuts and Rivets
Wire Nails ... Metal Lath
Concrete Reinforcing Materials
Berger Lockers, Bins, Shelving
Truscon Steel Windows, Doors, Joists,
Steeldeck Roofs and other fabricated building products

REPUBLIC STEEL
CONSTRUCTION FOR VICTORY

STEEL PRODUCTS

"TIME"

It softens hatred, heals wounds and proves that "FLEX-PLANE" ribbon joint is O. K. and maintenance near zero.

FLEXIBLE ROAD JOINT MACHINE CO.
WARREN OHIO, U.S.A.

So that there may be no lost time in starting, either with crank or rope; in any weather . . .

To assure positive, trouble-free ignition in operation . . .

To permit quick servicing if and when servicing is needed . . .

WISCONSIN HEAVY-DUTY AIR-COOLED ENGINES are equipped with a weather-sealed, fully accessible, *high-tension impulse-coupling outside Magneto.* A "flywheel magneto" is not good enough even for the smallest Wisconsin Engine.

MOST POWER Per POUND

WISCONSIN MOTOR Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Oxy-Acetylene Welding and Cutting—"Oxy-Acetylene Tips" contains a complete glossary of non-technical definitions of oxy-acetylene welding and cutting terms. Authors, lecturers, instructors and experienced welding and cutting operators use many terms that are perfectly familiar to them but may frequently be confusing to students, operators in training, or even experienced operators. This illustrated booklet will be of assistance to such persons.—*The Linde Air Products Co., 30 East 42nd St., New York City.*

Controlling Corrosion—A booklet describes efforts to overcome corrosion. Progress has been made in protective measures and this booklet gives some of the most efficient products developed for the control of corrosion.—*Protective Coatings, Inc., Detroit, Mich.*

Hard-Facing—A booklet that explains how an equipment user can to some extent overcome his repair parts problem by the use of hard facing, which is the restoration of worn parts to original dimensions by means of a welded overlay of exceptionally wear-resistant alloy. The advantages of hard facing are briefly outlined in this new publication. —*Coast Metals, Inc., 1232 Camden Ave., S. W., Canton, Ohio.*

Broadside on Road Machinery—This broadside illustrates and describes various machines and equipment used in the construction and upkeep of highways, including road brooms, cleaning units, supply tanks, distributors and many other units.—*Littleford Bros., Inc., 457 E. Pearl St., Cincinnati, O.*

Synthetic Rubber—A booklet entitled "The Five Commercial Types of Synthetic Rubber" has been issued for general circulation. It contains a technically accurate statement of the overall synthetic rubber situation. It traces the development of synthetic rubber from its laboratory beginnings, describes the properties of the commercial synthetic rubbers, and relates briefly the part played by this company in their development, manufacture and use in its products. It includes

Nationwide Recognition

In thousands of communities throughout the country and in hundreds of our military camps and bases throughout the world, J-M Transite Pipe today is providing efficient, economical water transportation. Available today to supply military and essential civilian needs, Transite Pipe offers a combination of advantages not found in any other pipe material. For complete information on this basic advance in water-line engineering and this modern, asbestos-cement water pipe, write for the Transite Pipe book TR-11A. Johns-Manville, 22 E. 40th St., N.Y.C.

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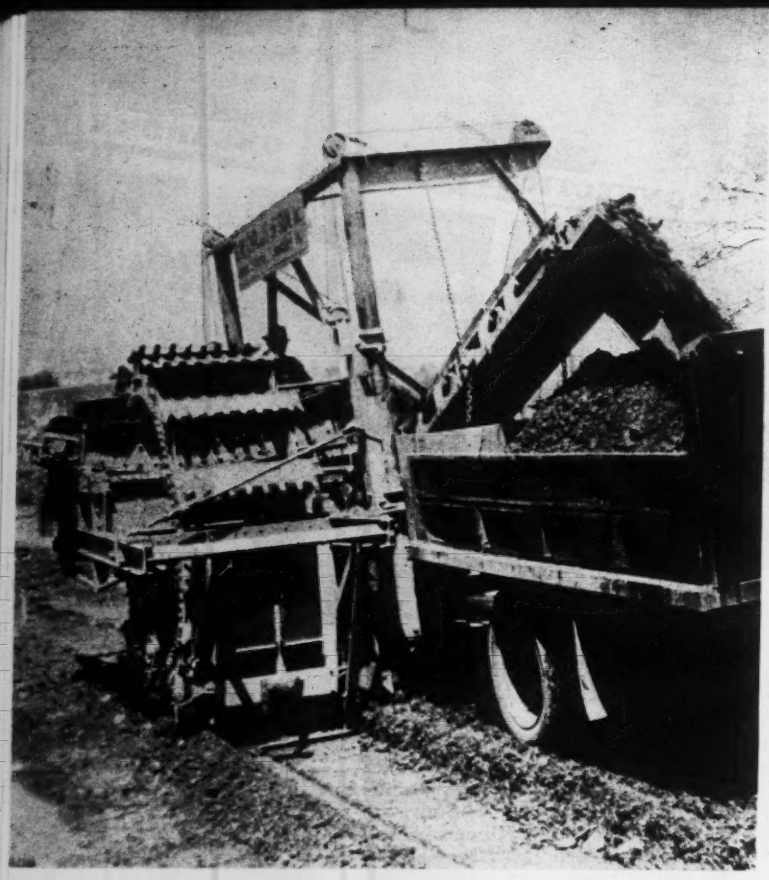
Transite Pipe

For Efficient Economical Water and Sewer Lines



Through THICK *and* THIN

The Power Must Be Right...

PIERCE KEEPS IT THAT WAY!

● Loading operations require close, dependable power control because of the constant variations in the load conditions. To protect the motor and keep the engine speed constant, the throttle must be automatically adjusted to meet these changes—that's the governor's job!

Pierce Flyball Governors quickly respond to any changes in load—on all types of power equipment—adjusting the engine speed instantaneously to provide the right amount of power *every second*. Pierce Governors bring you rugged, precision construction—in addition to their sensitive control—essential to dependable performance under every condition encountered in the field.

Now... and after the war... specify Pierce Flyball Governors for all of your equipment—whether gasoline, gas or Diesel-powered. They'll give you long, trouble-free service on any of your operations.

THE PIERCE GOVERNOR COMPANY
1647 OHIO AVENUE • ANDERSON, INDIANA

Pierce Governors
STANDARD SINCE 1913

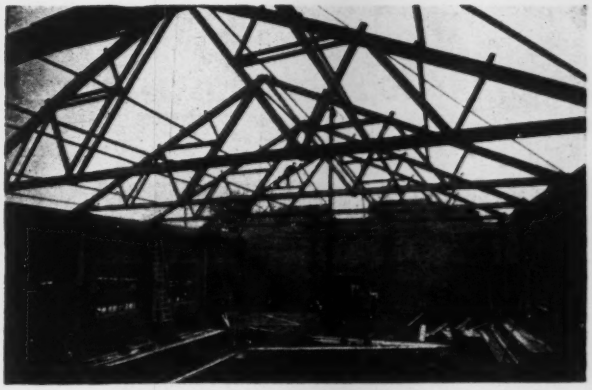
many photographs of synthetic rubber manufacture, and many diagrams.—*United States Rubber Co., Synthetic Rubber Division, 1230 Sixth Ave., New York, N. Y.*

Caterpillar Maintenance Booklet—A new illustrated booklet on preventive maintenance and repair of forged-track wheels has just been published. Combining recommendations for wartime care of this equipment with instructions on making new parts out of old, the booklet explains methods of rebuilding present used parts as a metal conservation measure. It shows how worn parts can be restored to original usefulness through welding, illustrating with pictures various steps of the process being explained.—*Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Ill.*

Vertical Axial and Mixed-Flow Pump—This new booklet describes units designed for pumping large volumes of liquid at comparatively low heads. They are available in a complete range of sizes for capacities to 75,000 gpm. and for heads to 100 ft. per stage. The pumps described are particularly suited for such services as condenser circulating, mine and general sump drainage, drydock dewatering, process work, bulk liquid transfer, irrigation, flood control, refinery processes, etc. The 20-page descriptive booklet done in two colors contains 27 illustrations among which are several large cross sectional views showing many features of design and construction.—*Ingersoll-Rand Co., 11 Broadway, New York, N. Y.*

Unit Heater—Two new specifications sheets describing unit heaters have been published. They relate in particular to the five-way vertical discharge unit heater and horizontal discharge unit heater. Each of these models utilizes about one-fifteenth the basic material used in direct radiation for the equivalent amount of heating. Providing for the discharge of warm air on 2, 3 or 4 sides and downward, the five-way unit supplies many individually controlled air streams from easily adjustable outlets and permits the user to vary the direction, distance and velocity of warm air distribution.—*Carrier Corporation, Syracuse, N. Y.*

Truck-mounted Cranes—An interesting catalog has just been issued describing the Crane Mobile, which is a truck-mounted crane for which it is claimed greater speed, stability, and higher capacity in a pneumatic-tire-mounted crane. The manufacturers say that this new crane was built as the result of a long study of the rigid requirements for successful performance—proper load dis-



Timber trusses for this Texas structure effected saving of $730.

LOWER COST • FASTER ERECTION

vital advantages of

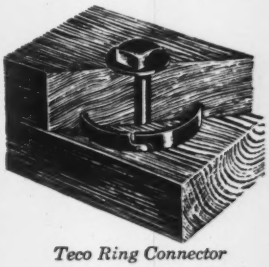
TIMBER CONSTRUCTION

In releasing steel for ordnance, timber construction has rapidly established its qualifications for:

1—Lower Cost 2—Rapid Erection
3—Adequate Strength

Estimated cost of five treated timber trusses for the building above was $770, compared with an estimated cost of $1,500 for similar trusses of steel.

Time saving factors are: the rapidity with which timbers and piece stuff are cut at the mill to pre-fabrication specifications . . . quick assembly of trusses at point of fabrication . . . light weight which facilitates raising into position.



Teco Ring Connector

Inherent strength in correctly seasoned structural timber is augmented with Teco ring connectors, shear plates and grids, providing load-bearings and joints with adequate safety factors.

Commanding the confidence of engineers and builders in the fundamentals of economy and enduring service, timber construction is contributing extensively to buildings for war needs and demonstrating sound practical reasons for its increasing use in peacetime building to come.

As large suppliers of lumber and timbers on both wartime and civilian projects, the manufacturers of Arkansas Soft Pine are prepared to furnish builders technical data, specifications, etc., which will be mailed promptly on request. Just address:

ARKANSAS SOFT PINE BUREAU

686 Boyle Building
LITTLE ROCK, ARKANSAS

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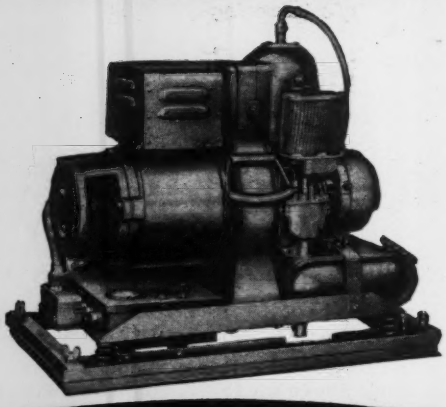


Portable Generators

The old Homelite story now has a new twist. Homelite Portable Generators have had plenty of experience in helping to speed emergency repairs . . . and, for that matter, they're still doing it.

But the big job now is to meet the greatest emergency of all time . . . *the war.* Therefore, all new Homelite Generators must go to the Armed Forces . . . to help our Air Force, Tank and Signal Corps do their jobs better and faster.

To meet the requirements of our fighting forces, many improvements have been added to Homelite Portable Generators. Our new models are more powerful, more rugged, and more able to operate under all conditions than ever before. And because of this they'll be far more valuable to you who will get them after the war.

The quality of Homelite Portable Generators — now produced in huge quantities — has earned the high Army-Navy production award. After the war, we'll produce as well for you.

HOMELITE CORPORATION

PORT CHESTER, NEW YORK

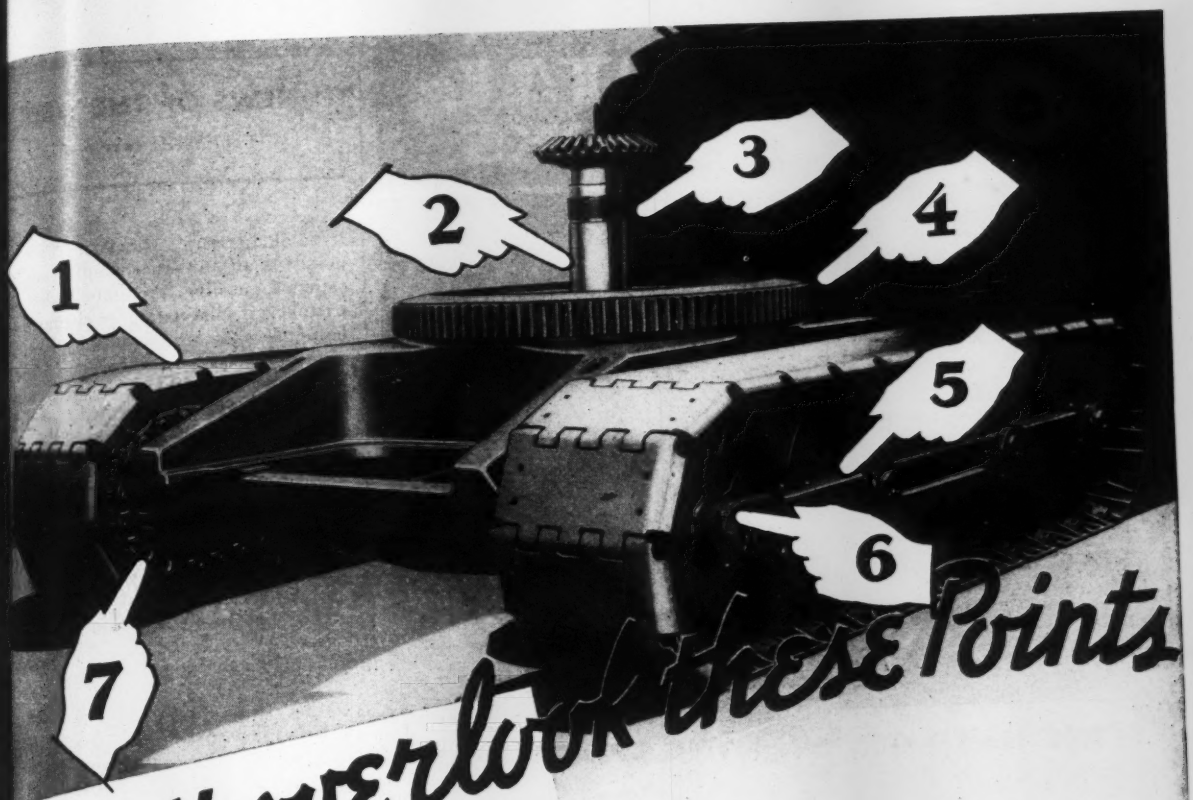
tribution, the minimizing of stresses and strain in the frame, the location of the center of gravity and many other engineering problems that can be met only by the development of a specially designed chassis.—*Bay City Shovels, Inc., Bay City, Mich.*

Fluorescent Fixtures—A comprehensive 8-page, two-color catalog has been issued to illustrate and explain the new features of this product. A group of photographic illustrations shows how the accessories provide for every method of mounting or hanging to fit every lighting situation in factory, office or drafting room. Other photos show how easily the fixtures are mounted in continuous rows, how readily accessible the starters are without disturbing the lamps.—*Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago, Ill.*

Grinding Valve Seats—Equipment best suited for grinding valve seats and valve faces in the various types of engines is pictured and described in a new folder entitled "Recommended Valve Seat Grinding Equipment." The following basic set of tools, comprising a complete outfit are itemized: high speed driver; valve grinder; dressing tool and pilot; valve seat indicator; pin for removing tapered pilots; and grinding wheel holders. The folder lists prices for the basic set and for different accessory groups covering various types of engines.—*Cooper-Bessemer Corp., Mount Vernon, Ohio.*

Condensers and Coolers — A booklet describing the new line of General Electric evaporative condensers and evaporative coolers has been issued by the company's air conditioning and commercial refrigeration divisions. The booklet offers some general application information with regard to wartime industrial uses of this equipment, shows features, and has a summary of specifications. It is an 8-page booklet profusely illustrated. —*General Electric Co., Air Conditioning and Commercial Refrigeration Divisions, Bloomfield, N. J.*

Swivel Light Units—The circular describes an adjustable light which stays put at any angle. The light is unaffected by machine vibration and requires no screws or wing nuts to adjust. Because of spring tension in the joint, the entire unit will not work loose or drop down. It is easy to adjust, requiring no wing nuts or setscrews. A special stop prevents the wires from twisting. The wire in the unit is completely enclosed, oil and dust resistant.—*Reliance Devices Co., Inc., 510 Sixth Ave., New York, N. Y.*



Don't overlook these Points

1. Maintain uniform tension on both tracks. Crawler belts should have a minimum of sag except in sand or gravel where more slack is desirable.

2. Lubricate center pin bushing heavily twice each shift. Clean regularly to prevent heavy grease and dirt from collecting around adjusting nut.

3. Center pin adjustment should be carefully maintained. Clearance of rear conical rollers should not exceed 3/16" with machine handling maximum load.

4. Ring Gear—Coat teeth with gear shield regularly. Roller Path—Keep free of excess dirt and grease.

5. Track adjustment is best accomplished on level ground. After adjustment has been made, coat adjusting screws with heavy oil. Dust and dirt corrosion on adjusting screws can be prevented by wrapping them after oil has been applied.

6. Track rollers should be greased at least every eight hours when machine is in use regardless of amount of traveling done. Grease all base fittings at frequent intervals when machine is being traveled. Check grease lines to inner bearings to see that they are not loose or broken.

7. Don't lubricate chains where they come in contact with sand or dirt. Keep adjusting axles at right angles to machine base for best chain and sprocket alignment. Keep chains sufficiently tight.

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SHOVELS LIMA DRAGLINES . . . CRANES

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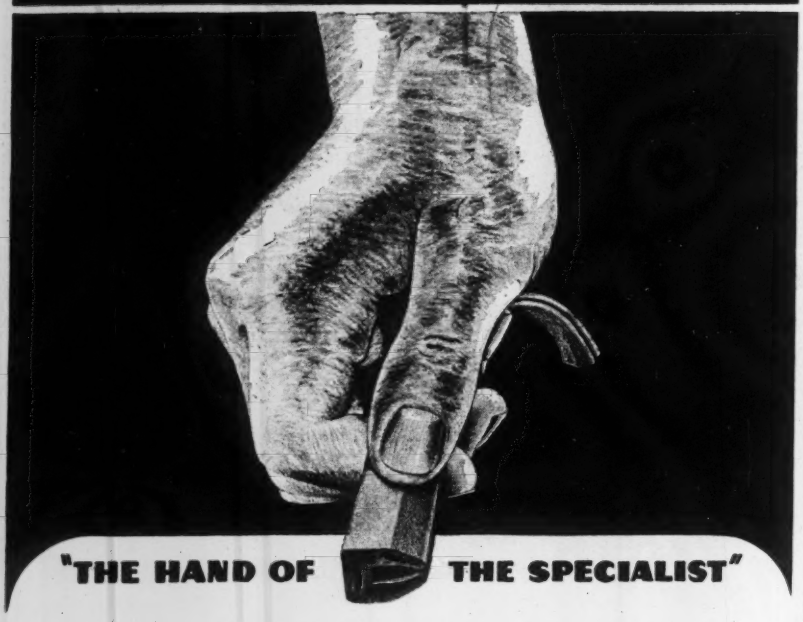

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THE PRESENT PACE in rubber development—especially in synthetics—presages an era of far reaching improvements for all users of industrial rubber goods. Wherever rubber or synthetic parts have been needed in the war effort, Continental has been of definite service. With forty years experience in the design and production of specialized rubber products, Continental is doing a real wartime job which will qualify it for even broader fields of service in the years to come.

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Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.
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Fast, Dependable
SHOVELS, CRANES
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10 Models of 3/4-5/8-1/2-3/8 cu. yd.
THE BYERS MACHINE COMPANY
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DISTRIBUTORS THROUGHOUT THE WORLD

NEWS OF THE WEEK

(Continued from p. 57)

To help save Michigan "A" [illegible] motorists an estimated month's supply of rationed gasoline, the state highway department is eliminating or changing traffic lights made unnecessary by war traffic conditions, says Commissioner Lloyd E. Reid. Declaring that the program will be completed in April, Reid said that during the first 30 days since the plan's inception, 106 traffic signals have been shut off or changed. He emphasized that this was accomplished without impairing traffic safety. Approximately 300 lights are being surveyed by traffic engineers to determine the advisability of maintaining present traffic signals. There are 701 lights on state trunklines outside of Detroit.

Milorganite, the fertilizer that the city of Milwaukee makes from sewage sludge at the city's disposal plant, is having such an unprecedented demand that the usual reserve tonnage of close to 10,000 tons is being depleted. One reason for the increased shipments at present is the shortage of synthetic nitrogen due to war restrictions, according to James J. Ferebee, chief engineer of the sewerage commission. Milorganite contains organic nitrogen and is therefore in great demand for commercial mixtures.

Milwaukee's much desired civic center, partially completed and awaiting disposition of some remaining property and the adjustments of assessments against abutting property owners, has been brought closer to final realization with the recent decision of the Wisconsin Supreme Court upholding the right of the city to make the assessments. The ruling clears the way for circuit court trials in 440 appeals.

The North Carolina legislature has just passed a law reducing the maximum two-axle-load on designated highways in the state from 30,000 to 26,000 pounds.

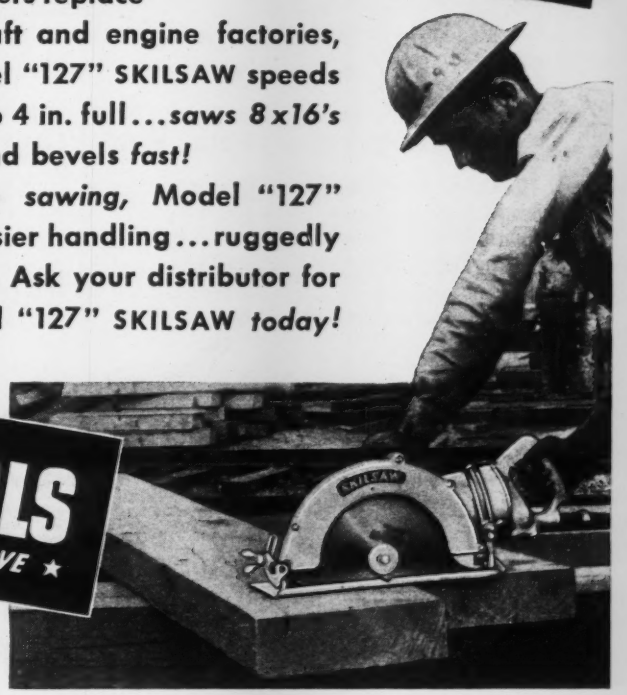
Col. W. A. Davis, representing the U. S. Army Engineer's Office at Nashville, Tenn., has assured Governor Kerr Johnson of Kentucky and a group of conservationists that the pool to be created by Wolf Creek Dam will not destroy Cumberland Falls or overflow Cumberland Falls State Park. Colonel Davis promised to submit maps to the National Park Service, as well as to the state of Kentucky, which will show

MODEL "127"

SKILSAW SPEEDS ALL SAWING ON TODAY'S HEAVY TIMBER CONSTRUCTION!

• Here's the big-capacity SKILSAW you need for speed where heavy timbers replace steel in war construction! On aircraft and engine factories, on tank and armament plants, Model "127" SKILSAW speeds every cut that's called for! Saws up to 4 in. full... *saws 8x16's in two quick cuts*... rips, cross-cuts and bevels *fast!*

Extra-powered for extra-deep sawing, Model "127" SKILSAW is light and compact for easier handling... ruggedly built for longest trouble-free service. Ask your distributor for a demonstration of Model "127" SKILSAW *today!*



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And to cut costs—AIR EXPRESS packages should be *packed compactly but securely*—to obtain best ratio of size to weight.

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TODAY, AIR EXPRESS not only serves the home front but is also working hand in hand with the Army and Navy to supply our fighting fronts throughout the world.

TOMORROW, AIR EXPRESS will girdle the globe in international peacetime commerce . . . to bring *all* foreign markets to the doorstep of American business.

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WRITE for our quick-reference handbook on "How to Ship by AIR EXPRESS During Wartime." Dept. PR-1, Railway Express Agency, 230 Park Avenue, N.Y.C.

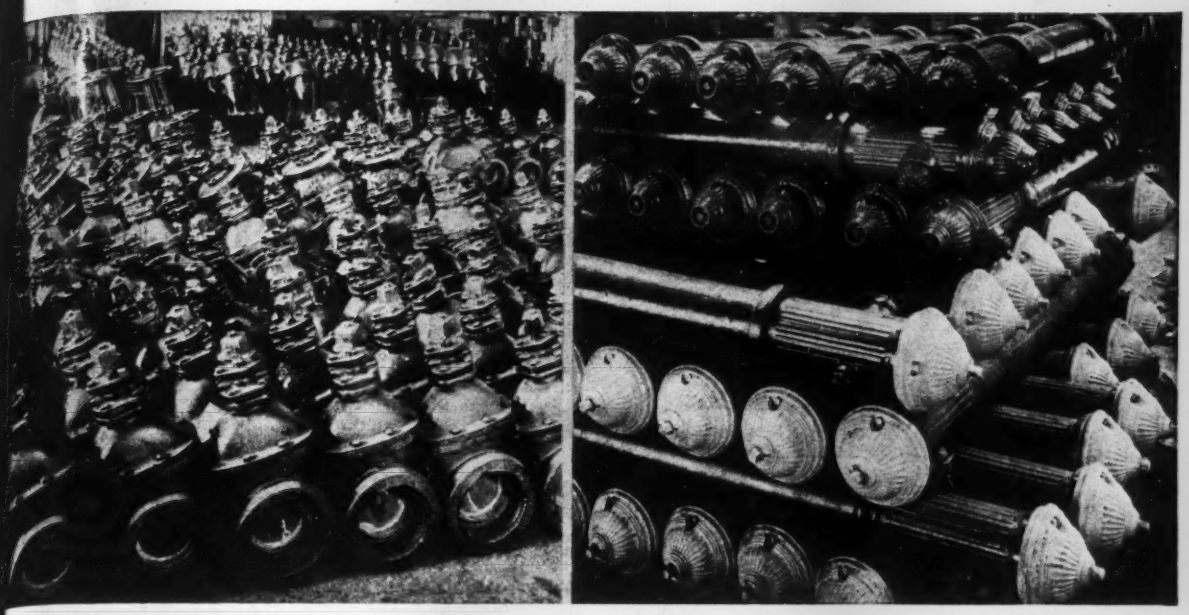
conclusively that only a flo[od] immeasu[rably] greater than any ev[er] record[ed] would back Cumberland [R]iver wat[er] high enough to obliterate [the] norm[al] 57-ft. drop of the falls.

Work is now in progress placing fo[ur] mooring anchors each weighing 100 ton[s] as a start on the removal of the pinnac[le] of Ripple Rock in Seymour Narrow[s] B. C. The British Columbia Bridge [&] Dredge Co. Ltd., will undertake th[e] drilling, blasting and removal of th[e] age-old obstruction to shipping. A sp[e]cial drilling barge has been complete[d] and is undergoing final tests. The bar[ge] will be moored to the four anchors no[w] under construction, one of which will b[e] placed in 67 fathoms of water. Ther[e] will also be two anchor blocks eac[h] weighing 250 tons. These will be bui[lt] on a scow. By opening the seacocks o[f] the vessel the concrete masses will b[e] tilted into the water.

ONE OF THE LARGEST world maps on pub[-] lic display, showing the 65 points on th[e] globe where the American armed force[s] are stationed, forms the background o[f] an unusual display of pneumatic tool[s] made by the Chicago Pneumatic Tool Co[.] A big illuminated Victory "V" serves a[s] a display base permitting over 10,000 persons daily to see the pneumatic tool[s] used to make airplanes, tanks, ships[,] guns, etc. This is the sixth in a series o[f] patriotic window exhibitions by the Chi[-] cago Pneumatic Tool Co. at its executive offices, 60 East 44th St., New York, N. Y.

Herbert H. Brown, superintendent o[f] the Milwaukee waterworks, Milwaukee[,] Wis., has asked the city council for an appropriation of $7,000 to be used for a pitometer survey by experts of the entire underground water main system of the city. It is expected this survey will re[-]veal the existence of all lazy water mains, inefficiency in operation and other facts that will be helpful for determining after war expansion plants.

The Board of Supervisors for Suffolk County, Long Island, N. Y., has adopted a program of salary increases for county highway department employees, the increments ranging from $100 to $250 a year. Minimum and maximum yearly salaries were established as follows: Junior engineering aides, $1,400 to $1,900, with annual increments of $100; senior engineering aides, $2,000 to $2,500, with increases of $100; junior civil engineers, $2,400 to $3,000, with increments of $120; assistant civil engineers, $3,120 to $3,870, with increments of $150; senior civil engineer, $4,000 to



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Prompt for delivery to you!

For nearly two years SMITH VALVES and HYDRANTS have been going into direct war construction. They have become a part of vast Ordnance work, Army and Navy camps, airfields and foreign bases. Today they are helping to build high octane gasoline refineries and synthetic rubber plants.

Because of this urgent war work, our regular customers, the public and private waterworks throughout the country have been unable to purchase our materials. Now, however, the war construction program is virtually completed and we are once again able to serve the waterworks field with the same SMITH standard of quality and we can do it PROMPTLY! Utilities order U-1 provides you with the priority, let SMITH provide you with your Valve and Hydrant requirements.

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Symbol of Quality
Since 1889

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. . . are the choice of those who want JACKSON standards of quality, dependability and performance. No other flexible shaft vibrator can offer such assurance.

Supplied with a 2⅝" and a 1¾" head. These two heads give user a vibrator efficient in and suitable for a wide range of applications. For instance, from wall sections of comparatively large size to narrow sections.

Model FS-6A, illustrated above, is furnished complete with 7, 14, 21 or 28 feet of shaft. Has dirt-proof turntable base. Supplied with or without wheelbarrow mounting.

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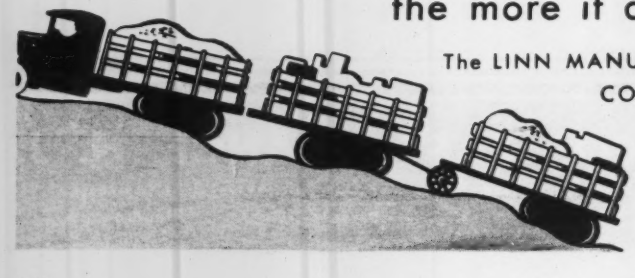
CONTOUR-FOLLOWING TRACTION

The more it carries, the more it can pull



The LINN MANUFACTURING CORPORATION
MORRIS, N. Y.

$5,000, with increments of $2[illegible]0; associat[illegible] civil engineers, $5,200 to $6,450, wi[illegible] increments of $250.

A proposed new building [illegible]ode for S[illegible] Louis, Mo., consisting of 1.8[illegible] pages an[illegible] representing the first comp[illegible]te revisio[illegible] in 20 years, has been completed afte[illegible] nearly six years of work and will shortl[illegible] be submitted to city officials by W. [illegible] Mullgardt, chairman of the project.

The principal purpose of the revisio[illegible] Mullgardt said, was to provide cheape[illegible] and safer construction, prescribe addi[illegible]tional health safeguards, and allow [illegible] the use of new materials and methods [illegible] construction. The new code would au[illegible]thorize welding in steel structures, whic[illegible] is now prohibited. Mullgardt said weld[illegible]ing is faster and more economical tha[illegible] riveting and points out that after the wa[illegible] a large number of trained welders would[illegible] be available.

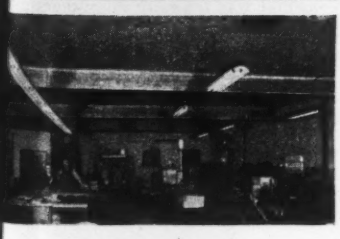
All War Department construction i[illegible] the Louisville, Ky., and Southern Indiana[illegible] area has been placed under the direction[illegible] of the recently organized Louisville area[illegible] office of the U. S. Engineer Corps under[illegible] Maj. Stratton O. Hammon, who was for[illegible]merly an architect in Louisville. Projects[illegible] included are Standiford Airport; Louis[illegible]ville Modification Center, Bowman Field[illegible] Louisville Ordnance Depot, Jeffersonville[illegible] Quartermaster Depot, and Nicholas Gen[illegible]eral Hospital.

Japan would be extremely vulnerable[illegible] to attacks on its dams and hydro-electric[illegible] plants, according to Dr. William Monro[illegible] White, hydraulic engineer, formerly man[illegible]ager of Allis-Chalmers, Milwaukee, Wis.[illegible] hydraulic department, who supervised the[illegible] installation of such equipment in eight[illegible] Japanese plants. Dr. White points out[illegible] that if American bombers could get bases[illegible] close enough to strike they would have[illegible] access to about 100 such targets and crip[illegible]pling them would hinder Japan's war[illegible] effort at least nine months and possibly[illegible] for the duration of the war. He explained[illegible] that lack of coal in Japan has made[illegible] water power a first essential.

The Waco, Tex., water department re[illegible]cently granted to its employees a general[illegible] wage increase that averages about 5 per[illegible] cent. For the employees at Lake Waco,[illegible] the source of the municipal water supply,[illegible] the department granted an increase of[illegible] 40 percent.

Construction in the Army's Ohio river[illegible] division embracing Ohio, West Virginia,[illegible] Kentucky and Indiana, totaled more than[illegible] $525,000,000—equal to the cost of the[illegible] Panama Canal, from the time of Pearl[illegible] Harbor to the end of 1942, Col. Charles[illegible] H. Hall, division engineer, has reported.[illegible] He said that the federal government's

RILCO *Timber-Connector* TRUSSES



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● In five modern plants strategically located for prompt service, Rilco is fabricating, under rigid production controls, many types of roof trusses and structural framing members made of wood—and delivering them to the job site, ready for fast erection.

The trusses illustrated above support the roof of over 30 acres of factory space for a well known airplane engine plant. In a midwest city, now under construction, is one of the largest Aircraft plants in the country—for it Rilco is fabricating 150 foot solid timber-connector trusses.

Rilco engineers and manufactures wood Laminated Beam Arches for such structures as airplane hangars, drill halls—wherever wide post-free spans are needed. For chapels, churches, garages, gymnasiums—for many types of buildings serving civilian needs, Rilco offers a wide variety of shapes and sizes of wood laminated arches—bowstring trusses, beam arches, boomerang arches, arch rafters, and for one and two story structures the Rilco plybeam.

Rilco products are engineered for the requirement of the job. They meet U. S. Army and Navy specifications and building code requirements. They bring to the job economy of materials, speed in erection and architectural beauty.

Whatever the type of building you're planning, wherever its location, *North*, *South*, *East* or *West*, Rilco framing members are available for priority building. Complete engineering data, design service and consultation are available to you.

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real estate purchases sinc Pearl Ha cover an area equal to th of Rhod land, Massachusetts, Del are, the trict of Columbia and fou fifths of Jersey. The Army alone has acqu 24,000 sq.mi., an area qual to a half that of England.

In order to acquaint wo men perso further with work being done thro out the district, with a view to pro utilization of women employees as placements for men workers entering armed forces, the Wilmington Dist U. S. Engineer Office spon sored an cial trip recently to the various const tion areas for certain of its women ployees. The women employees vis Camp Mackall, Greensboro Replacem Training Center, Fort Bragg and o projects, constructed wholly or in by the Wilmington District Engineer fice. At Fort Bragg the civilian emplo met representatives of the WAAC uni that station, and made a study of various phases of work being done the women in service.

Twenty old bridges on the Inter tional Railway Co's abandoned hi speed trolley lines to Niagara Falls Lockport, N. Y., will be scrapped o claimed to aid the war program. Pr dent B. J. Yungbluth, of the Railw has announced. The bridges have a t weight of 2,831 tons. Four truss sp have been sold to the Army to be mantled and reassembled later elsewhe

During testimony before a Hou Representatives appropriations subco mittee on the Interior Department's n appropriation bill, Secretary Ickes s that he had approved the enactment authorization for a second road to Ala with the understanding that work on would be deferred until after the w Mr. Ickes asserted: "I would be incli to suggest to the Army engineers th instead of another highway they build elevated railroad."

State Engineer R. H. Baldock, of Or gon, reports that progress is being ma toward the extension of U. S. Highw No. 20 westward from Albany, Ore present terminal, thereby making it fact a coast-to-coast transcontinent highway. The eastern terminus is Boston, Mass.

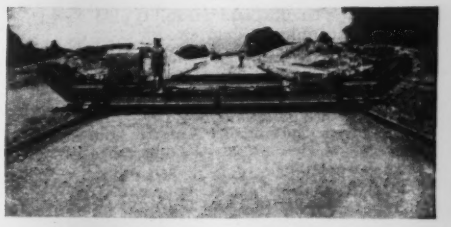
A special war training course designe to give practical instruction in the prep aration of engineering contracts an specifications to engineers and execu tives has been opened at the Universi of Maryland, Baltimore, Md. It is a 7 hour course running for 12 weeks wit two 3-hour night classes a week. Dea S. S. Steinberg, head of the College Engineering, is in charge.

. . . maybe you won't need a

BUCKEYE R-B POWER FINEGRADER!

IF you had a thousand of these fellows swarming all over your grade you might possibly get as much work done as you could with an R-B Power Finegrader. *In the meantime,* you can help speed the day when the prisoner list will look like a roster of Axis-dom by completing vital roads and runways *now* with R-B machines. These one-man operated Finegraders, available up to 25 ft. width, cut the grade to exact cross section, set a pace for the paving crew, save time and labor, reduce loss of yield and save materials, truck time and transportation.

No other existing equipment can prepare subgrade for paving as quickly, cheaply and accurately as a Buckeye R-B Power Finegrader. Write for bulletin today.



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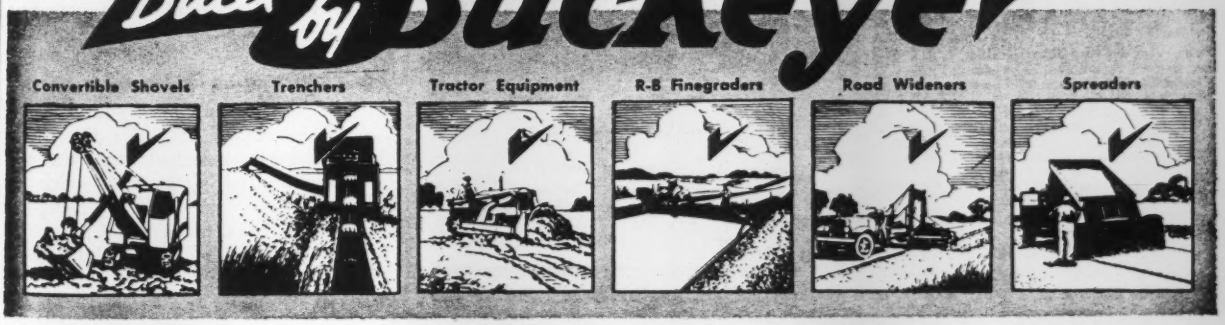

America's Finest stop at the BUTLER HOUSE

"We are stopping at the Butler House," said one American doughboy shortwave broadcasting from Iceland. Many a letter from Alaska to the tropics have mentioned the comfort and liveability of these half-round military quarters.

Butler engineers and metal crafters receive news of Butler Houses with great satisfaction. Comfort was held uppermost in mind in designing and factory-fabricating living quarters for America's finest people, our armed forces going abroad. Critical steel had to be conserved. So, strength great enough to carry earth embanked against the side walls for bomb protection was engineered into light gage steel. Compact, sectionized construction was necessary to ship by rail, water and air in the smallest possible space. Speedy erection and ready application of plenty of insulation was a prime factor.

From more than 25 years of know-how in the manufacture of steel buildings, came mass production of Butler steel military quarters that defy the heat of desert sun, the blasts of arctic blizzards and the monsoons of tropic jungles.

When the last gun is fired to end global war, the world will continue to benefit from the war sharpened skill of Butler metal crafters. As we produce for war we plan for peace.

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can reduce your construction costs. It is efficient and dependable, an established product.
WE RECOMMEND "GUNITE" for structural steel protection, floor and roof slabs, thin exterior walls, partitions, tanks, reservoirs, restoring disintegrated concrete surfaces, repairing reinforced concrete, etc. Let us suggest how "Gunite" can best solve your problems.

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MITCO
OPEN STEEL FLOORING

Pressure Formed
90% Open Area
Easy to Install

Hendrick Manufacturing Company
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MEN AND JOBS

Arthur G. Odell, Jr., of Charlotte, N. C., of the Army Engineer Corps, has just been promoted to the rank of major at the Charlotte Quartermaster Depot where he is post engineer and signal officer.

Replacing area offices at Ravenna and Warren Ohio, a new area office has been established at Youngstown, Ohio. To this office **Col. Herbert D. Vogel,** Pittsburgh district engineer, has assigned Capt. Joseph M. McNulty, Maj. Wilbur A. Stevens, Maj. Allan H. McCarnes, and Maj. W. I. English.

Miss Alleen Thompson, librarian in the department of engineering at the Pennsylvania State College, who was recently commissioned an ensign in the Waves, has been assigned to the Naval Air Station, Miami, Fla.

Forest Talmadge Green, Wilson, N. C., engineers who entered the army in September, 1942, has just been promoted to the rank of captain from that of major at Camp Chaffee, Ark.

J. A. Lalonde is now general production manager of the Marine Industries Limited of Sorel, Que. He was formerly general manager and chief engineer of the Quebec Paving Co., Montreal.

Charles F. Bowers, professor of architectural engineering at Iowa State College, has been commissioned a first lieutenant in the army air forces and is in training at Miami Beach, Fla.

W. D. White, former resident engineer in charge of the Durham, N. C., area office of the North Carolina Highway and Public Works Commission, has been transferred with his staff to Greensboro, with the closing of the Durham office.

Lt. George A. Anderson, St. Peter, Minn., assistant Nicollet County highway engineer, has reported for active duty at the naval air station at Quonset Point, R. I. He served as assistant county engineer for eight years.

Lt. Col. Clarence E. Stahl, Stillwater, Minn., has been appointed special assistant to the division engineer Col. Lewis Pick, who has charge of army war construction in nine states over which the Missouri river division has jurisdiction. Lieutenant Stahl was formerly supervisor of the PWA office in Duluth, Minn.

Paul C. Blalock, Jr., Freemont, N. C.,

AIR *and* WATER . . . *Life Would Cease to Exist Without Them, BUT—*

we gladly leave the all-important task of supplying America's cities, towns and communities with clear, pure water up to you competent W-W Engineers. *Our* job is air . . . compressed air—ready to go to work at the touch of a button wherever power driven tools are required in maintaining and expanding your intricate supply lines.

Illustrated above is a SCHRAMM Model 105 De Luxe Compressor at work on a demolition job for the City Water Works at Binghamton, N. Y., operating with housing doors in place. This pneumatic tired two-wheeled trailer is equipped with built-in stream line tool boxes and additional hose reels. It is light in weight and designed for quick handling to the job and on the job. A universal trailer coupling provides a safe towing connection between car or truck even at maximum towing speeds. . . . Like all Schramm Portable Compressors, the 105 De Luxe is a rigid, in-line unit, water cooled 100% . . . Sizes from 20 to 420 Actual Air Delivery. For complete data on these compact, hard-hitting power plants write us today for Catalog PB.

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THE COMPRESSOR PEOPLE
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"THROW YOUR SCRAP INTO THE FIGHT"

1½ H.P. GASOLINE POWERED UNIT

• Hand puddling methods are no match for this all-purpose, 9-job MALL Vibrator that will place a stiffer mix faster with important savings in cement, sand, water, and labor. MALL Vibrated concrete assures a better bond with reinforcement; it is free from honey combs and voids; it permits an earlier stripping of forms and makes a stronger, water-tight job.

8 other quickly interchangeable tools, for Concrete Surfacing, Pumping, Sanding, Wire Brushing, Sawing with Circular Saw, Drilling, Grinding and Sharpening Tools—make this easily portable unit easy to keep busy.

Full information mailed upon request.

★★ Manufacturers of Portable Electric Saws, Drills and hundreds of other portable power tools and attachments

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7730 SOUTH CHICAGO AVE. CHICAGO, ILLINOIS

Offices and Distributors in Principal Cities

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OPERATED ENTIRELY BY ONE MAN

UNLOADS AUTOMATICALLY!

Your materials can be handled faster and at less expense with Clipper Hoists.

It's almost like having a "Rubber Arm Hod Carrier", who from his position on the ground can reach to any point on your scaffold.

Easily attached to any Scaffold plank for handling Brick, Tile, Mortar, Lumber, Flue Lining or most any other object.

Built by the makers of Clipper Masonry Saws . . . available on TRIAL . . . Immediate shipment of any quantity.

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THE CLIPPER MFG. CO.

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SAINT LOUIS, MISSOURI

has been promoted to the rank of captain from that of first lieutenant at Hunter Field, army air base, at Savannah, Ga., where he is assistant sub-depot engineering officer.

Capt. Sam Hayworth of Asheboro, N. C., has been transferred from Morris Field, Charlotte, N. C., where he has been post engineer for the past 15 months, to the office of the division engineer, Fourth Corps Area, Atlanta, Ga.

J. C. McCallen, of Jackson, Tenn., division maintenance engineer of the Tennessee highway department, has been named division engineer. **W. B. Haynes,** Memphis district maintenance engineer, has been named his successor.

Ralph J. McMahon, chief engineer, Texas State Land Office, Austin, Tex., has resigned to accept a position as chief cartographer with the Magnolia Petroleum Co., Dallas, Tex.

Hal G. Sours, highway director of Ohio has announced the appointment of **C. H. MacKeever** as acting chief engineer for the Ohio highway planning survey to succeed **Donald F. Pancoast,** now Ohio adjutant general. Mr. Sours said **J. J. Darnell** of Columbia, acting survey manager since Pancoast became head of the guard, is to retain the title of manager.

R. A. Harris, chief engineer for the Mississippi State Highway Department, has been granted a military leave of absence to serve in the Navy. He will be succeeded by **Julian D. Montgomery,** of the highway department.

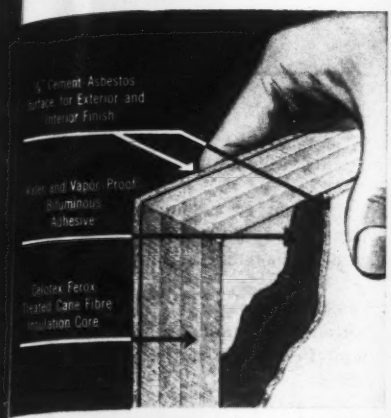
V. W. Enslow has been appointed bridge engineer of the Missouri State Highway Department. **W. D. Chrisman,** who has been acting division engineer at Springfield, has been made division engineer there.

T. W. Craig has resumed his duties as county engineer of Marshall County, Kan., with headquarters at Marysville. He had been on a leave of absence for other engineering work.

Gottfried Theilkas, Kansas City, Mo., formerly construction engineer at the Lake City Ordnance plant, has left for Alaska where he is a senior engineer for Foley Bros., Inc., in the construction of the Haines cutoff road to the Alcan Highway.

Lt. Col. C. S. Davis, formerly with the J. A. Tobin Construction Co., of Kansas City, Kan., as engineer and superintendent, is now on duty in the U. S. Engineer Office at Omaha, Neb.

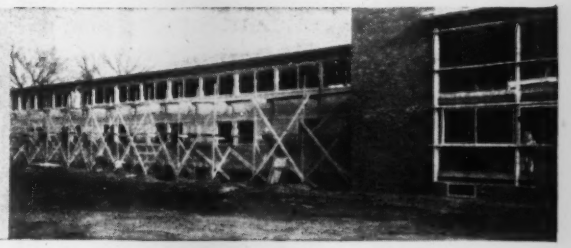
HOW *Cemesto* WALL UNITS SPEED COMPLETION OF HUGE HOUSING PROJECT


½" Cement Asbestos Surface for Exterior and Interior Finish
Asbestos and Vapor Proof Bituminous Adhesive
Celotex Ferox Treated Cane Fibre Insulation Core

This drawing shows detail of Cemesto Wall Units.

Built with a minimum of critical materials, big housing project will comfortably house thousands of women war workers.

Cemesto's strength does away with need for intermediate support. Saves lumber and nails.



See how easily big Cemesto units go into place. Speeds completion of huge dormitories.

Here's how a unit of the housing project looks from the air.

Cemesto Combines Strength, Insulation, Permanent Exterior and Interior Finish for Housing and Factory Projects.

ENGINEERS all over America recognize the spectacular achievements of Cemesto in speeding the completion of war-important housing and factory building projects.

The reason for this outstanding performance is that one thickness of Cemesto does the work of many materials and can be used efficiently with wood framing.

This revolutionary new construction method deserves your serious attention because it saves time, lumber and other materials—all-important factors in wartime building. For further details, see box at right.

The word Celotex is a brand name identifying a group of products marketed by The Celotex Corporation.

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INSULATING WALL UNITS

THE CELOTEX CORPORATION · CHICAGO

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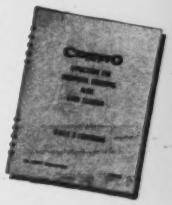

is a fire and moisture-resistant wall unit composed of a cane fibre insulation core with asbestos cement covering on both sides. It is a multiple-function material making a rugged insulated wall section with complete exterior and interior surfaces. For complete information on Cemesto construction for walls with wood framing, or roof decks write for these new portfolios of detail drawings. FREE!

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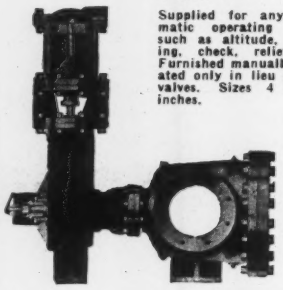
The GOLDEN - ANDERSON line includes Water Pressure Reducing Valves, Water Control Valves, Single and Double Acting Altitude Valves, Manual Water Service Valves, and many others. A letter today will bring our illustrated catalog, listing all G-A Valves. Write!

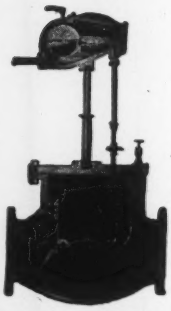
CONE THRU-FLOW VALVE

Supplied for any automatic operating service such as altitude, reducing, check, relief, etc. Furnished manually operated only in lieu of gate valves. Sizes 4 to 72 inches.



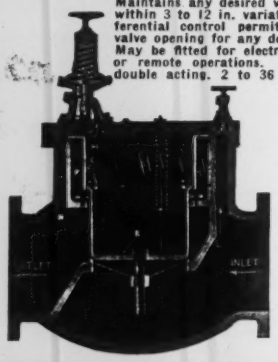
CONTROLLED FLOAT VALVE

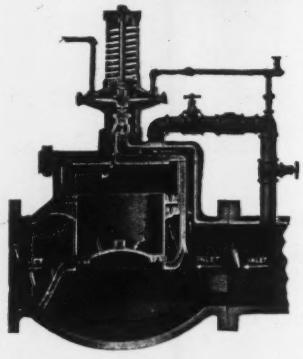
Maintains water level within 1" variation. Suitable for closed or open tanks. If desired, this valve can be furnished without self contained float ball chamber. Air and water cushioned. Sizes 3 to 36 inches.



ALTITUDE CONTROL VALVE

Maintains any desired water level within 3 to 12 in. variation. Differential control permits delayed valve opening for any depth tank. May be fitted for electric control or remote operations. Single or double acting. 2 to 36 in. sizes.





WATER REDUCING VALVE

Gives constant terminal-delivery pressure under varying demands. No shock, no jar, no metal contacts upon adjustment. Sizes ½ to 36 inches.

GOLDEN-ANDERSON VALVE SPECIALTY CO.

FULTON BUILDING . . . PITTSBURGH, PENNSYLVANIA

MEETINGS

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION, 50th anniversary meeting, Chicago, Ill., June 19-20.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC., spring meeting, Drake Hotel, Chicago, Ill., June 27-29.

AMERICAN SOCIETY FOR TESTING MATERIALS, 46th annual meeting, Hotel William Penn, Pittsburgh, Pa., June 28-July 2.

AMERICAN SOCIETY OF CIVIL ENGINEERS, summer meeting, Biltmore Hotel, Los Angeles, Calif., July 28-30.

REGIONAL AND LOCAL MEETINGS

AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS, Highway Traffic Advisory Committee meeting, Atlanta, Ga., June 21-22.

OHIO CONFERENCE ON SEWAGE TREATMENT, 17th annual conference, Mansfield-Leland Hotel, Mansfield, Ohio, June 23.

MICHIGAN MUNICIPAL LEAGUE, UPPER PENINSULA CONFERENCE, Iron Mountain, Mich., June 24-25.

WISCONSIN COUNTY HIGHWAY COMMISSIONERS AND COUNTY HIGHWAY COMMITTEE MEMBERS meeting, Wausau, Wis., July 14-16.

NORTH CAROLINA LEAGUE OF MUNICIPALITIES, annual meeting, Raleigh, N. C., Aug. 12-13.

Elections and Activities

THE ENGINEERING SOCIETY of Buffalo, N. Y., has elected officers for 1943 as follows: George W. Gleasner, president; C. O. Dean, vice-president; Kenneth K. Koontz, secretary, and Bert F. Wertman, treasurer.

WALTER S. LEE, Rochester, N. Y., was reelected president of the Building Officials Conference of America at their May meeting in Richmond, Va. Other officers are Andrew C. Leake, Kalamazoo, Mich., first vice-president; Herbert L. Seaman, Pittsburgh, Pa., second vice-president; and Arthur N. Rutherford, West Hartford, Conn., secretary-treasurer. The executive committee consists of James H.

A KAISER-TYPE JOB Needs Truck-Trailers!

A LOT OF FACTORS enter into the fabulous ability of the Kaiser shipyards to turn out Liberty Ships and Tankers almost as if they came from punch presses.

One of these is the handling of material . . and that's where Truck-Trailers come in. At the four Kaiser yards on the Pacific Coast, various types of Trailers haul many kinds of material . . all of it heavy and hard to handle . . and most of it typical of the loads that after-the-war construction will involve.

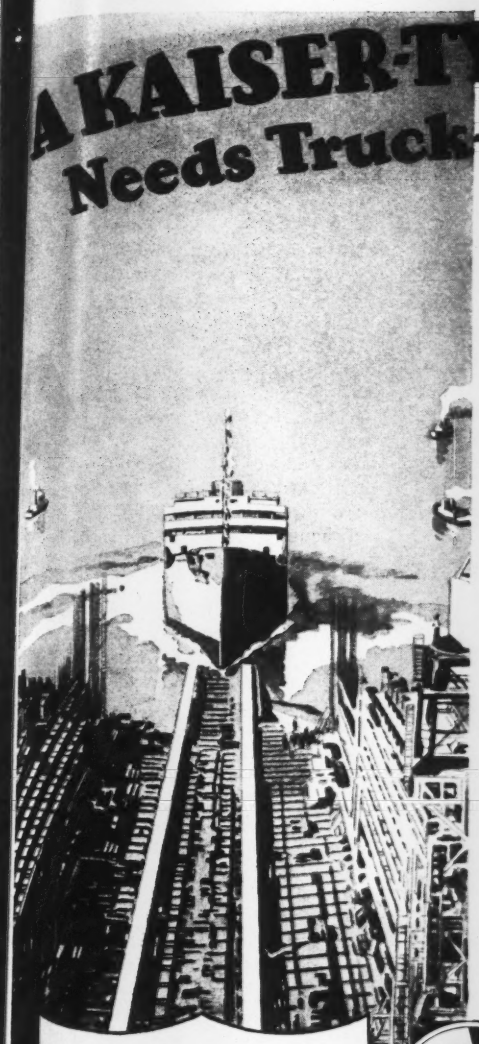
The operation illustrated below indicates the ability of Trailers to take over the difficult, unusual jobs. Boilers for Liberty Ships . . giant units weighing 50 tons . . are fabricated in one place, tested a quarter-mile distant, then installed in ships on ways a half-mile to a mile farther on. That's assembly-line production, a la Henry J. Kaiser. And Fruehauf Trailers are the conveyors.

This Kaiser operation is highly specialized, of course . . as are many of the heavy-duty construction jobs handled by Fruehaufs . . but Trailers do routine work with equal facility. And most of their tasks couldn't be done as well, if at all, by any other method.

World's Largest Builders of Truck-Trailers

FRUEHAUF TRAILER CO., Detroit

Member Automotive Council for War Production

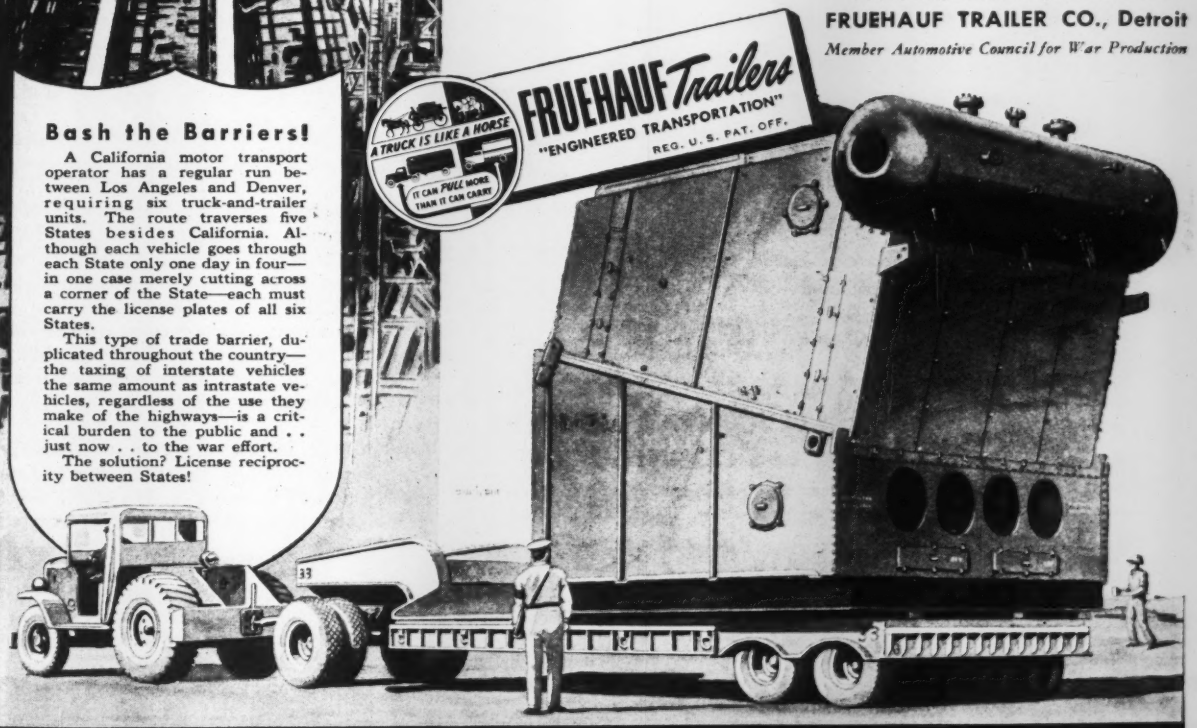


Bash the Barriers!

A California motor transport operator has a regular run between Los Angeles and Denver, requiring six truck-and-trailer units. The route traverses five States besides California. Although each vehicle goes through each State only one day in four—in one case merely cutting across a corner of the State—each must carry the license plates of all six States.

This type of trade barrier, duplicated throughout the country—the taxing of interstate vehicles the same amount as intrastate vehicles, regardless of the use they make of the highways—is a critical burden to the public and . . just now . . to the war effort.

The solution? License reciprocity between States!



TRUCK-TRAILER TRANSPORT IS DOING AN ESSENTIAL JOB FOR ALL AMERICA

HIS HOME IN THE ARMY

...the chances are it's built of Douglas Fir Plywood!

● Yes — it's very likely that your soldier lives in a Douglas Fir Plywood cantonment or hutment. For millions of feet of this engineered lumber have been and are still being used to house our troops — both here and abroad. The big panels save time and labor, build warmer, wind-tight structures . . . Plan to profit from these advantages, too, after Victory. Use Douglas Fir Plywood as the principal structural material in your post-war home and get far more house for your money!

The Army is using tens of thousands of these Victory Huts built by Texas Prefabricated House and Tent Co.

SEND FOR FREE WAR USE FOLDER! It shows scores of ways this Miracle Wood is helping our Armed Forces. Douglas Fir Plywood Assn., Tacoma, Wash.

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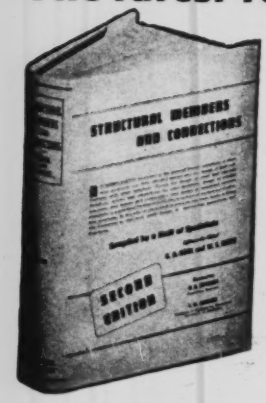
MADE LARGER, LIGHTER SPLIT-PROOF STRONGER

STRONGER PER POUND THAN STEEL!

The latest technical know-how—on design of structural members and connections

to aid you in greater safety of design larger economies—FASTER WORK



EVERY factor you need to consider in designing steel, wooden or concrete members or connections is covered inclusively in this famous Hool and Kinne book, which will help you attain a maximum of efficiency, safety and economy of design. A veritable encyclopedia, it is a *complete and up-to-date reference* on theory and design of members and connections—a *standard* of best design practice—*a handy manual* of quick-reference tables, diagrams, design graphs, etc., to shorten and speed up calculations—a *convenient single source* of A.S.T.M., A.R.E.A., A.I.S.C., and A.C.I. standards, design stresses and design data, codes, etc., etc.— A noted staff of specialists compiled this authoritative book which is now revised to include latest design or construction procedures and standards.

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Look it up in HOOL and KINNE'S

STRUCTURAL MEMBERS and CONNECTIONS

Revised by R. R. Zipprodt and F. N. Menefee

639 pages, 6x9, illustrations, charts, diagrams and tables, $6.00

Just Published Revised Second Edition

6 BIG SECTIONS

- general theory
- design of steel and cast-iron members
- splices and connections for steel members
- design of wooden members
- splices and connections for wooden members
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Mooney, Boston, Mass.; J. H. Martin, Jackson, Miss.; Frank S. Lang, Kansas City, Mo.; W. H. Peace, Miami, Fla.; K. F. Gillies, Toronto, Canada, and Stuart Duggins, Richmond, Va.

JOHN EARLE, of the Earle Equipment Co., Detroit, Mich., has been elected president of the Michigan Construction Equipment Dealers Association. A. O. Cuthbert, Lansing, was elected first vice-president and R. G. Moeller, of Detroit, second vice-president.

W. W. MITCHELL, director of the state highway department, has been elected president of the Arkansas Engineers Club. Other officers are: G. A. Wilkins, vice-president; Mike Thomas, secretary; and R. A. Kern, steward. Elected to the board of directors were E. F. Nelson, chairman; J. M. Page, F. I. Brown, F. A. Gruver and Col. A. M. Neilson.

J. GORDON JONES has been elected president of the Engineering Professions Club, of Jacksonville, Fla. Leon Frank has been elected vice-president; Frank Robinson, treasurer, and D. O. Foshee program director.

A. O. DUFRESNE, deputy minister of the Quebec Provincial Department of Mines, has been elected president of the Corporation of Professional Engineers of the Province of Quebec; vice-president, C. C. Lindsay; secretary-treasurer, A. D. Ross, councillors: J. A. McCrory, P. E. Poitras, J. O. Martineau, E. A. Ryan, A. Laframboise.

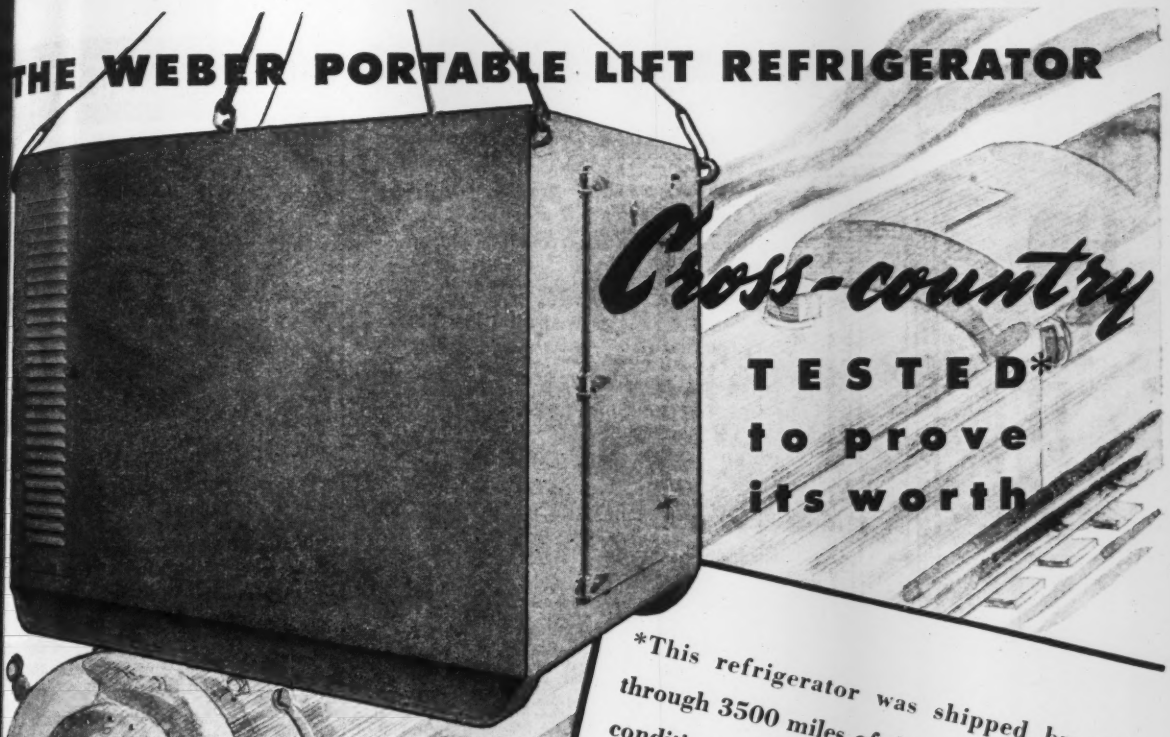
W. H. M. LAUGHLIN, designing engineer with the Dominion Bridge Co. Ltd., has been elected chairman of the Toronto branch of the Engineering Institute of Canada. S. H. DeJong was re-elected secretary-treasurer and the new directors are F. J. Blair, E. G. Hewson, C. F. Morrison, R. F. Legget, A. Hull and E. Cross.

THE DES MOINES Engineers Club has elected the following officers for 1943: president, A. H. Wieters; vice-presidents, C. H. Carlson, J. F. McLaughlin and Paul Winfrey. The secretary-treasurer is Monroe L. Patzig.

P. H. DANIELS has been re-elected president of the Highway Engineers Association of Missouri. J. J. Corbett has been elected for his fifth term as secretary.

T. M. S. KINGSTON, city engineer of Chatham, Ont., has been elected president of the Canadian Section of the American Water Works Association. Dr. A. E. Berry, chief engineer and director of the sanitary engineering division of the Ontario department of health, continues in office as secretary-treasurer.

THE WEBER PORTABLE LIFT REFRIGERATOR



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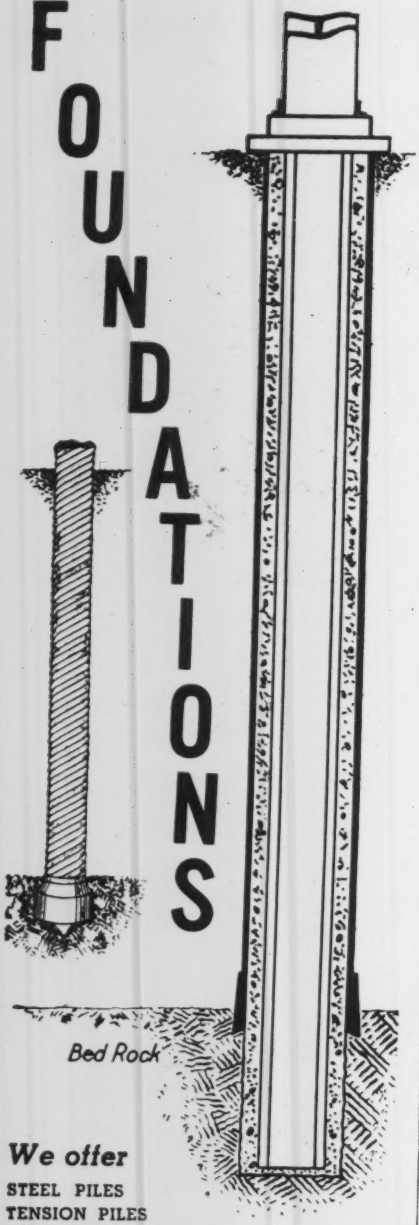

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POST WAR PROJECTS

WATERWORKS

Minn., Faribault—City, T. A. Mealia, city clk., installing c.i. watermains. $160,000. F. McKellip, city engr.

★**Tenn., Memphis**—Memphis Light, Gas & Water Div., c/o Major T. H. Allen, Memphis Light, Gas & Water Div., 12 projects, incl. new wells, watermains, pump, equip. as needed, electric substation and enlarging electrical distr. sys., exten. gas mains and increased capacity of standby plant for producing artificial gas in emergencies. $3,232,627.

SEWERS & WASTE DISPOSAL

Ill., Peoria—City, overflow storm sewers. L. Jeffries, city engr.

★**Ia., Waterloo**—City, K. Matthews, clk., garbage grinding plant, $125,000; storm and sanitary sewer extens. $2,000,000.

Minn., Duluth—City, C. D. Jeronimus, city clk., installing 10-24 in. sanitary sewer to relieve present installations. $85,500. I. W. Ward, city engr. CD 9/16—ENR 10/1.

Minn., Edina (P. O. Minneapolis)—Village, B. Hawthorne, clk. installing sanitary sewer lateral in northeast sect. of village. Est. $50,000. P. W. Smith, village engr.

Minn., Faribault—City, addnl. storm sewers. $95,000. F. McKellip, city engr.

Minn., Moorhead—City, R. G. Price, clk., sanitary sewers, various locations, $25,000; sewage disposal plant repairs and addns. $25,000. W. C. Hokanson, city engr.

Minn., Wheaton—City, E. D. Lindig, city clk., sewage disposal plant. $50,000. M. E. Chamberlin, city engr. CD 5/26.

N. Y., Brooklyn—Dpt. P. Wks., Municipal Bldg., New York, preparing studies, reports, etc. in connection with fdns., etc. for Owls Head Sewage Treatment works, Wakeman Pl. Moran, Proctor, Freeman & Mueser, 420 Lexington Ave., New York, engrs. CD 3/22—ENR 3/25.

N. Y., LeRoy—Village Bd., W. L. Davis, mayor, municipal sewerage sys. Over $25,000. Wm. S. Lozier, Inc., 10 Gibbs St., Rochester, engrs.

N. D., Grand Forks—City, C. J. Evanson, aud., sewer, watermains, storm sewers, addn. to sewage plant and to water treatment plant. Over $50,000. A. F. Hulteng, city engr.

Utah, Orem and **Provo**—Cities of Orem and Provo, trunk sewer line to serve Orem and west Provo area. $322,000. E. Jacob, City Hall, Provo, city engr. of Provo.

Ont., Galt—City, incinerator, town market bldg. exten., and constructing swimming pool.

Ont., Weston—Municipality, c/o H. G. Mussen, clk., enlarging sewage disposal plant and other imprvs. $75,000.

BRIDGES, GRADE CROSSING ELIMINATION

D. C., Wash.—District Comrs., District Bldg., highway bridge; South Capitol Street Bridge over the Anacostia River and Dupont Circle underpass; K Street elevated highway from Rock Creek to Key Bridge and Canal St.

★**Ont., Toronto** — Toronto Transportation Comn., Toronto, plans large program imprvs. for system, incl. separation of grades between main line street car routes and automotive traffic, over $12,000,000 of new equipment, garages, substations, and track construction.

ROADS

D. C., Wash.—District Comrs., District Bldg., paving Alabama Ave. and Bowen Rd. S.E., Massachusetts Ave. N.W., West Virginia Ave. N.E., Reno Rd. N.W., Sheriff Rd. N.E., 49 St. N.E., Dalecarlia Parkway N.W., Weaver St. N.W., Eastern Ave. N.W. and N.E., Alabama Ave. S.E., Eastern Ave. N.E. and N.W., Division Ave. N.E., Taylor St. N.E., Utah Ave. N.W., Bunker Hill Rd. N.E., widening 6 St. N.W., M St. S.E., Massachusetts Ave. N.W.

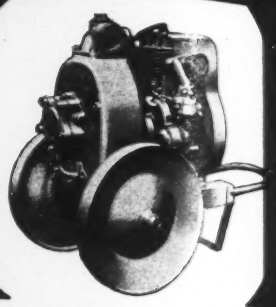
N. Y., Amagansett—Bd. Supervs. Suffolk Co., Riverhead, roads. $200,000.

★**Tenn., Memphis**—Dpt. P. Wks., c/o R. S. Fredericks, City Hall Court House, 47 projects embracing street, curb and gutter imprvs., completing Memphis flood control plan, 6-lane concrete highways at gateways to city, exten., repairing existing sewerage facilities, incl. $2,150,000 for exten. Wolf River interceptor sewer. Est. $18,655,909.

EARTHWORK—IRRIGATION, DRAINAGE—WATERWAYS

†**Arkansas**—U. S. Eng., 300 Bway., Little Rock, flood control, navigation and imprv. Arkansas, White, St. Francis and Ouachita Rivers.

JAEGER "SURE PRIM



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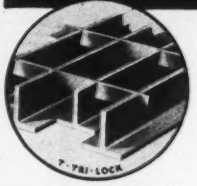

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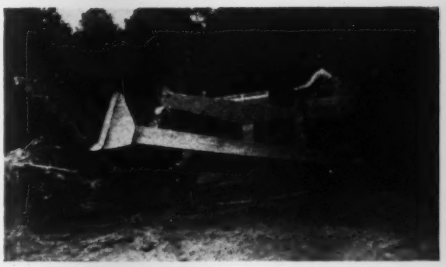

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POSTWAR PROJECTS (Cont'd.)

Okla., McAlester—C. A. Bentley, mgr., making plans flood control of Sand Creek through city, $100,000. E. Magoffin, McAlester, engr.

★**Tenn., Memphis**—City and Shelby Co. Health Dpt., c/o Dr. L. M. Graves, 879 Madison St., 16 projects mostly for malarial control in various drainage districts and new public health clinics, distributed over city and county. $1,740,608.

UNCLASSIFIED

New York—IMPROVEMENTS—Dpt. Marine & Aviation, Pier A, North River, making studies, surveys, sketches, layouts and preliminary plans imprvs., bldgs. and related subsurface services, at Idlewild Airport, Queens Boro. Delano & Aldrich, 126 E. 38 St., New York, archts.

★**Tenn., Memphis**—DOCK, etc.—Dpt. P. Serv., c/o R. S. Fredericks, City Hall Court House, general imprvs. to aid river transportation, incl. new dock for heavy cargoes, repairing wharf and approaches, and channel imprv. $891,000.

Tenn., Memphis—PARK IMPROVEMENTS, etc.—Memphis Park Comn., J. Vesey, Court House, 5 projects, incl. general imprvs. parks and parkways and $177,000 imprv. Overton Park Zoo in order that more animals may be confined behind moats to simulate their natural habitat. $369,564.

Tex., Dallas—TUNNEL—Union Terminal Co., Union Sta., tunnel under railway tracks and providing exits by ramps, for Union Terminal Ry. Sta. $450,000. E. A. Wood, city of Dallas Plan Engr.

★**Tex., Pasadena** — TUNNEL — City, c/o Mayor, tunnel under Houston Ship Channel. $5,000,000. Garrett Eng. Co., 3504 Audubon St., Houston, engrs.

B. C., Burnaby (P.O. Dist. Vancouver)—AUDITORIUM, etc.—Municipality, centrally-located auditorium and sports stadium. $200,000.

Ont., Fort William—EXHIBITION GROUNDS IMPROVEMENT, etc.—Canadian Lake Exhibition Bd., c/o City Hall, program of imprvs. to Exhibition grounds, office bldg., and other new construction. $150,000.

PUBLIC

Conn., Norwalk—City, P. Jacobs, supt. Schools, East Ave., brick, steel addn. Board River School. $150,000.

★**D. C., Wash.**—District Comrs., District Bldg., Emma Merritt Junior High School, 49 and Hayes Sts. N.E., $875,000; school to replace Cranch, Tyler and Van Ness, 11 and G Sts. S.E., $500,000; school to replace Dent, Lenox and French, 3 and D Sts. S.E., $500,000; Walter B. Patterson School, Nichols Ave. and Chesapeake St. S.W., $198,150.

★**D. C., Wash.**—District Comrs., District Bldg., Units 2, 3 and 4, Central Public Library, 499 Pennsylvania Ave. N.W. $4,000,000.

Ind., Michigan City—State Dpt. Conservation, H. Barnhart, dir., State Library Bldg., Indianapolis, resort hotel addn., remodeling, Dunes, State Park along Lake Michigan, near here, La Porte Co. $150,000.

Ind., Nashville—State Dpt. Conservation, H. Barnhart, dir., State Library Bldg., Indianapolis, resort hotel, Brown County State Park, near here. $250,000.

Ind., Versailles—State Dpt. Conservation, H. Barnhart, dir., State Library Bldg., Indianapolis, resort hotel, Ripley County State Park, near here. $250,000.

Ind., Winamac—State Dpt. Conservation, H. Barnhart, dir., State Library Bldg., Indianapolis, resort hotel, Winamac Recreation Area, along Tippecanoe River, near here, Jasper Co. $250,000.

★**N. Y., New York**—Bd. Educ., 49 Flatbush Ave., Brooklyn, plans by A. F. Gilbert, 358 5 Ave., P.S. 133, 133 St. and 5 Ave. $782,000. CD 1/29—ENR 2/4.

N. D., Minot—State Armory Bd., Adj. Gen. H. L. Edwards, Bismarck, plans by E. W. Molander, 508 1st Ave., and I. L. Rush, Minot, armory bldg. $200,000.

★**Tenn., Memphis**—Memphis Housing Auth., c/o W. B. Fowler, 264 N. Lauderdale St., 16 slum clearance projects, various parts of city to supplement 5 such projects already built and the Lemoyne Gardens which is now under construction. $45,212,000.

★**Tenn., Memphis**—City Bd. Educ., c/o E. C. Ball, supt. Schools, 317 Poplar St., 18 projects, incl school addns., and 4 new schools. $3,129,738.

★**†Puerto Rico**—Committee on Design of Public Works, San Juan, (consisting of Commissioner of Interior, the Chairman of the Planning Board, The Director of the Budget, the Director of the War Emergency Program, and another person to be appointed by the Governor), is authorized to recommend to the Governor allotment of moneys from $100,000 fund to Government Agencies "for the preparation of plans and specifications for hospitals, schools, public housing, sewers, waterworks, parks, roads and other public imprvs." Total est. imprvs., $50,000,000.

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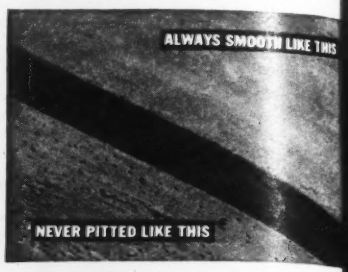

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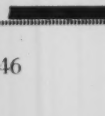

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POSTWAR PROJECTS (Con

Ont., Mimico—Municipality, clk., town hall, fire station, torium. $400,000.

COMMERCIAL

Conn., Hartford—Hartford cil, M. Klingel, 749 Tolland St. auditorium and athletic field.

Mich., Detroit—Blessed Sa dral, Woodward and Belmont G. F. Diehl, 120 Madison Ave. and completion of structure, at Belmont Sts.

Minn., Minneapolis—Abbott Anderson, mgr., 110 E 18 St., bsmnt., rein.-con., brick, nurs 18 St. and 1 Ave. S. $250,000

Pa., Reading—Albright Co sketches by Rither & Eiler, 147 nasium bldg. $212,000.

Tex., Luling—Elks Club, c/o secy. Elks State Assn., c/o Elk 820 Crawford St., Houston, for crippled children's hospital Park, 8 mi. south of here. $150,000 or

Tex., San Antonio—Trinity Waxahachie, fireproof bldgs. (expansion gram) over $150,000; addl. grounds ment, athletic diamonds, athletic cinder track, bleachers, etc. over CD 3/4—ENR 3/12.

Wash., Seattle—University Congrega Church, E. 43 and Brooklyn Sts., $150,000.

PROJECTS CANCELLED BY WAR PRODUCTION BOARD INCLUDE:

Idaho—State Department Public Boise, relocating Route 30, from Boise to Joplin cemetery.

Texas—State Highway Department 4 concrete slab bridges across Rice Anderson Creeks, on U. S. Hy. 67 Corley and Carbondale; concrete paving Bassetts to near 0.1 mi. Sulphur River Route 67, Bowie Co.

CIVILIAN PROJECTS AUTOMATICALLY FALL INTO POST WAR RESERVE

CONSTRUCTION REPORTS

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York
ELSIE EAVES, Manager *SCOTT McLEOD, Statistician*
(Daily service also available—Write for details)

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect—Engineer-Management type of contract.

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply — Unclassified
Sewers, Waste Disposal — Latin America
Bridges, Grade Cross'gs — Public Buildings
Streets & Roads — Commercial Buildings
Earthwork, Waterways — Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

WATER SUPPLY

PROPOSED WORK

Ill., Chillicothe—G. Stumbaugh, waterworks supt., new water pump. station, well.

Mich., Adrian—Water filtration and pump. plant. $200,000. Finbeiners, Pittis & Strout, 725 Nicholas Bldg., Toledo, O., engrs.

†O., Newton Falls—Village, H. S. Hoag, clk., plans nearing completion WW imprvs., intake line to river, low service pump. station, 3500 ft. 10 in. water line, water treatment plant, chemical feed equip. $80,000. **FWA.** Rollin F. MacDowell, Chester-12 Bldg., Cleveland, engrs. CD 3/16—ENR 3/18.

O., Steubenville—E. Brandfess, city service dir., waterworks rebuilding and addn. Plans deposit $25. R. F. MacDowell, Chester-12 Bldg., Cleveland, engr.

Ore., Salem—State Bd. Control, Salem, installing 50,000 gal. water tank on 130 ft. tower, new pipelines, hydrants, pumps, sprinkler sys. for addnl. fire protection at state flax plant, state penitentiary. $40,000.

★**Tex., Fort Worth**—City, S. H. Bothwell, mgr., water reservoir for North Side, $750,000. Applied for FWA funds. Freese & Nichols, Capps Bldg., and J. J. Rady, Majestic Bldg., Fort Worth, engrs. CD 6/1—ENR 6/10.

Tex., Galveston—G. W. Fraser, mayor, 10 in. water line. Over $15,000.

BIDS ASKED

Bids Asked June 22

N. Y., New York—Comr. Parks, Office Dpt. Parks, Arsenal Bldg., 64 St. and 5 Ave., Central Park, altering pump. sta., incl. mechanical work, at Orchard Beach Bath House, Pelham Bay Park, Bronx Boro, Contr. X-39-143.

Bids Asked June 29

†Tex., Amarillo—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., D. C., drilling deep water supply well, pump. unit, pump house, etc. Extended date. CD 5/4—ENR 5/6.

LOW BIDDERS

Md., Bloomington — Upper Potomac River Comn., J. J. McMullen, chr., Liberty Trust Bldg., Cumberland, May 27, water supply facilities for Savage River Dam, from G. S. Hazelwood, Cumberland, **$21,500.** CD 5/12—ENR 5/20.

†Minn., Minneapolis—City, Minneapolis Park Bd., C. F. Doell, secy., Courthouse, June 1, watermain exten. at Wold-Chamberlain municipal airport, placing 12 in. c.i. main along 46 Ave. S. from 57 to 59 Sts., etc., pipe, from American Cast Iron Pipe Co., 941 Plymouth Bldg.,, **$14,077:** construction, from Orfei & Mariani, 1744 Sheridan Ave., St. Paul, **$11,265. FWA.** CD 5/26.

Pa., Phila.—Dpt. P. Wks., Bureau Water, City Hall, June 3, c.i. watermains various intersections, from M. and J. B. McHugh, 892 N. Markoe St., **$19,371.** CD 5/26.

†S. C., Union—Federal Works Agency, Candler Bldg., Atlanta, Ga., June 1, waterworks exten., SC 38-150, from Deconynck & McDaniel, Columbia **$115,939.** pumping, from Columbia Supply Co., 823 Gervais St., Columbia, **$10,870.**

★**†Tex., Corpus Christi**—Federal Works Agency, 702 Electric Bldg., Fort Worth, May 27, 16 mi. 39 in. water pipeline, pump. plant and 10 m.g. reservoir, from E. Loyd, 3101 Stadium St., Fort Worth, and Alkin & Hinman, Corpus Christi, on Sects. A and B, concrete pipe, and auto engine, **$1,046,223.** CD 6/1—ENR 5/13.

†Tex., Gainesville—R. P. Reagan, city mgr., June 3, water well, furnishing, installing deep well pump and c.i. main, Tex. 41-602, from Layne-Texas Co., 3901 Elm St., Dallas, **$32,000.** CD 5/18—ENR 5/20.

CONTRACTS AWARDED

†Idaho, Farragut—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., drilling, casing 3 deep wells at Naval Training Station, NOY 6195, to A. A. Durand & Son, Walla Walla, Wash., **$37,915.**

†Md., Elkton—Bd. City Comrs., Elkton Town Hall, filtration plant addn., Docket Md. 18-168, to Thompson Co., 4615 Hazel Ave., Phila., Pa., **$28,754. FWA.** Bids 5/19.

†North Carolina—U. S. Eng., 308 Customhouse, Wilmington, concrete reservoir and piping for same, Iden. 982-43-222, Richmond Co., to Higgins & Gaines, Greensboro. Est. **$40,000.** Awarded 6/9.

R. I., West Greenwich—State, Dpt. Finance, Div. Purchases, State House, Providence, water sys., Mooseneck, to Atlantic Pump & Supply Co., Inc., 5 Steeple St., Providence. Est. **$15,000.** Bids 6/4.

S. C., Union—Exten. WW sys., incl. pipe and concrete work and filtration plant, to Deconynck & McDaniel, P. O. Box 1265, Columbia. **$115,939.** Howard Beebe & Co., Spartanburg, engrs.-archts.

†Texas—U. S. Eng., 25 St. and Avenue F, Galveston, steel water storage tank, Cameron Co., to Pittsburgh-Des Moines Steel Co., Praetorian Bldg., Dallas, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, addnl. underground utilities, incl. WW, sewers, gas lines, Bexar Co., to J. Lockhart, 1006 Travis Bldg., San Antonio, under **$50,000.**

Wis., West Bend—K. H. Weiss, city clk., June 7, well, to Layne-Northwest Co., 709 N. 11 St., Milwaukee 3, Wis., 390 ft. depth, **$12,459,** 1,200 ft. depth, **$17,709.** CD 11/27—ENR 12/3.

Que., Valleyfield—9,000 ft. concrete and iron piping, day labor. **$60,000.** R. Belanger, City Hall, engr.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

★**Calif., Los Angeles**—City Council appropriated $1,200,000 repairing, imprv. sewerage sys. during next fiscal year. L. Aldrich, City Hall, engr.

Conn., Derby—C. F. Caldwell, mayor, competitive plans from engineers for sewage disposal plant. Over $25,000. CD 5/19—ENR 5/27.

Conn., Stamford—City preliminary plans storm drains Henry and Cedar Sts. $25,000. L. E. Tuttle, Town Hall, engr.

†Ind., Charlestown—Federal Works Agency, 20 N. Wacker Dr., Chicago, Ill., brick, rein.-con. sewage disposal plant, $44,600. L. S. Finck, 276 Century Bldg., Indianapolis, engr.

†Neb., Bellevue—F. H. Freeman, mayor, storm sewers, miscellaneous street imprvs. $252,540. **FWA.** Henningson Eng. Co., Standard Oil Bldg., Omaha, engrs. CD 1/13—ENR 1/21.

N. M., Bayard—L. Pelpelman, mayor, sanitary sewerage sys., $48,813. Applying for FWA funds. Koch & Fowler, c/o Gr. Natl. Life Bldg., Dallas, Tex., engrs.

N. Y., Millerton—Village Clerk, Town Hall, sewage disposal plant, sewerage sys. exten. $125,000; pump. sta. $10,000.

Ore., The Dalles—N. H. Martin, mayor, City Hall, bids within 30 days, sewerage, watermains, roads and railroad track to complete river terminal site for city industrial use. $70,000. C. P. Faurso, Wasco County Bldg., engr.

Tenn., Memphis—J. Boyle, city comr. Police St., rejected bids Apr. 27, imprv. Sect. 1, sewer from Getwell along Nonconnah Creek to Tennessee Chute, Shelby Co. CD 5/17—ENR 5/20 under LB.

Tex., Goose Creek—Laying 6 in. sanitary sewer lines. $25,000.

Ont., Sarnia—Enniskillow Twp., drainage imprvs., $25,000. C. Monteith, County Bldg., engrs.

BIDS ASKED

Bids Asked July 13

Calif., Los Angeles—Bd. Supervs. Los Angeles Co., vitr. clay sanitary sewers in Washington Ave. and other streets. Over $25,000. A. Jones, Hall of Records, engr.

LOW BIDDERS

Calif., Los Angeles—Los Angeles Co., Hall of Records, Los Angeles (12), June 1, sanitary sewers, Addington St., Atlantic Blvd., Butler Ave., etc., CI 1075, from Artukovich Bros., 7320 Atlantic Ave., Hynes, **$97,954** using brick structures; from R. A. Wattson Co., 5528 Vineland Ave., North Hollywood, **$98,595,** using concrete structures.

Conn., Hamden—Town, June 7, 7,725 ft. 15 in. sewers, appurtenances, Pershing St. and Dixwell Ave., from Bedford Hills Constr. Co., 90 Hartland St., East Hartford. Plan B **$32,095.** T. Walden Wright, Town Hall, engr. CD 5/26—ENR 5/27.

†D. C., Wash. — District Comrs., District Bldg., June 10, storm water sewer, S. Capitol St. between Anacostia River at Poplar Point and Portland St., Docket DC 49-115, from National Structures Corp., 10 E. 40 St., New York, N. Y., **$419,081. FWA.** CD 5/25—ENR 5/27.

†Tex., Hondo—City, June 2, sewers, Tex. 41-560-F, from English & Wilson, 1221 Navarro St., San Antonio. **$90,795. FWA.** CD 5/18—ENR 5/20.

†Tex., San Antonio—City, G. B. Mauermann, mayor, June 3, enlarging sewage disposal sys., Tex. 41-401, from O. J. Broughton, 3548 Rosedale St., Dallas, **$64,000** base bid. **FWA.** CD 5/24—ENR 5/27.

CONTRACTS AWARDED

†California—U. S. Eng., 1209 - 8 St., Sacramento, sanitary sewerage sys., Contr. 1105-Eng-5017. Fresno Co., to Kruly & Van Valkenburgh, Sacramento, under **$50,000.**

†Louisiana—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., 10 ton incinerator, Vernon Parish, to Werner Co., 1320 Pierre Ave., Shreveport. Bids 6/4.

†New Jersey—U. S. Eng., 6 and Walnut Sts., Phila., Pa., sewage pump. sta., Monmouth Co., to Charles Christenson & Son, 921 Bergen Ave., Jersey City. Est. **$50,000.**

†New Jersey—U. S. Eng., 120 Wall St., New York, N. Y., sewer lines, Passaic Co., to F. C. Lawton, 362 E. 27 St., Paterson. Est. **$50,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, sewers, drainage sys., Jefferson Co., to Sullivan, Lynch & Hainsworth, 1822 McGilvra Blvd., Seattle, under **$50,000.**

Ont., St. Thomas—Exten. sewage disposal plant on No. 4 Hy., incl. new digestion chamber, storage tank, sludge drying bed, grit chamber alterations, etc., to D. McDougall, Bluevale, about **$26,148.** Gore & Storrie, 1130 Bay St., Toronto, engrs.

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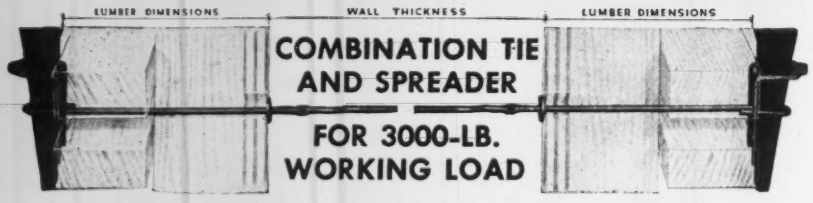

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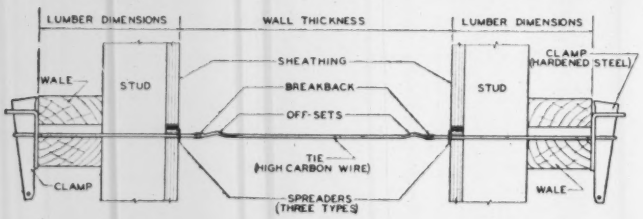

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PROPOSED WORK

Tex., Gainesville — City, c/o C. Murphy, 5 concrete, timber bridges over Pecan Creek, exten., river bank rock lining, straightening Elm Creek Channel, street grading, etc. Over $25,000.

Que., North Hatley—Quebec Central R.R., F. H. Hibbard, supt. and ch. engr., Sherbrooke, bridge over Massawapi River at outlet of Upper Massawapi Lake. $30,000.

BIDS ASKED

Bids Asked June 26

Quebec — Deputy Minister Dpt. P. Wks., Quebec City, 5 span, 70 ft., rein.-con. bridge over Ste. Anne River, Hy. 6, on Boulevard Perron, Ste. Anne Des Monts, (Gaspe North), for Municipality of Ste. Anne Des Monts, and Dpt. P. Wks., Quebec City. Plans deposit $5. CD 6/4—ENR 6/10.

Bids Asked June 30

California — State Div. Hys., Sacramento, rein.-con. slab bridge across Posa Creek, Kern Co. G. T. McCoy, state hy. engr.

LOW BIDDERS

†**Virginia** — At office H. J. Spelman, dist. engr. Pub. Roads Admin., 1440 Columbia Pike, Arlington, June 8, Project VA DA WR-21, Bridge 102, Henry G. Shirley Memorial Hy., Arlington Co., from Capital Excavating Co., Inc., 65 N St. S.E., Wash., D. C., $83,654. CD 5/25—ENR 5/27.

CONTRACTS AWARDED

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., excavation and pipe culvert in place, Contr. 436-Eng-10084, Lee Co., to Cone & Manly Contracting Co., Caesar St. and Cumberland Rd., Tampa, under $50,000.

Missouri — St. Louis County Court, H. L. Mueller, presiding judge, Clayton, 1 story, 9 x 25 ft. toll house for bridge, incl. 2 pylons and electric eye sys., to Massman Constr. Co., foot of Arlee St., St. Louis 11, Mo., $39,370.

N. B., River Mills—Provincial Govt., Fredericton, bridge, to Joseph MacVey & Son, 7 Main St., St. Stephen, $35,000. Dpt. P. Wks., Fredericton, engrs.

Ont., Fergus—Nichol Twp., c/o W. L. Deans, R. R. 1, Fergus, rein.-con. bridge, to L. M. Arnott, 7 Eliza St., Arthur. Est. $25,000. F. McGee, R. R. 4, Guelph, engr. Bids 5/21. CD 5/13, under Guelph.

STREETS AND ROADS

BIDS ASKED

Bids Asked June 22

N. J., Belleville—Town, Town Hall, 10,100 sq. yd. FABC 2 surface on 6 in. concrete paving. Main St., Sect 2. C. G. Faust, Town Hall, engr.

N. Y., New York—President Manhattan Boro, Municipal Bldg., relaying granite block pavement in front of Piers 2 and 3, on Marginal St., north and south of Morris St.; regulating, 1 in. asphalt on 6 in. concrete repaving W. 17, W. 74, W. 85, W. 101, W. 102, E. 54, E. 67, E. 75, E. 77, E. 83, E. 86, E. 81, E. 95, E. 105, E. 107 and E. 108 Sts.; regulating, sheet asphalt repaving, Riverside Dr. W.; test borings, West and Marginal Sts. between Rector and Liberty Sts., Contr. 61, in connection with construction elevated public highway.

West Virginia—State Rd. Comn., D. McClaugherty, clk., Charleston, surface treatment 10 mi. U.S. 250, near Philippi, to Nesterville Rd., State Secondary Proj. 5021, Barbour Co.; 4.08 mi. Town Camp Run-Gilmer Co. line Rd., S.P. 3404-C, Doddridge Co.; 2.7 mi. Beards Fork Rd., State Secondary Proj. 5604, 6.2 mi. Armstrong Creek-Elk Ridge Rd., State Secondary Proj. 5025, 3.7 mi. U.S. 60, Edmond Rd., State Secondary Proj. 5382, 3.6 mi Hico-North Rd., State Secondary Proj. 5181, all foregoing Fayette Co.; 7.5 mi. Stumptown to Shock Rd., State Secondary Proj. 5093, Gilmer Co.; 19.76 mi. U.S. Route 50 to Jct. W.Va. 9 Rd., S.P. 3470 and 3457, Hampshire Co.; 2.58 mi. Sissonville-Jackson Co. line Rd., S.P. 3259-B; 4.1 mi. Campbells Creek Rd., State Secondary Proj. 5109, 3.6 mi. U.S. Route 21 to Jct. Secondary Route 33/2 (Coon Creek), Secondary Route 33, State Secondary Proj. 5410, all foregoing Kanawha Co.; 3.2 mi. Chapmanville-Boone Co. line, State Secondary Proj. 5940, and 4.4 mi. Chapmanville up Crawley Creek Rd., State Secondary Proj. 5792, Logan Co.; 6.89 mi. Athens-Summers Co. line Rd., S.P. 3450, Mercer Co.; 7.5 mi. Berwind-West Virginia State line Rd., State Secondary Proj. 5461, McDowell Co.; 16.67 mi. Beckley-Wyoming Co. line Rd., S.P. 2022, 3239 and 3390 A & B; 7.2 mi. State Route 3 via Sweeneyburg-Maynor Rd., State Secondary Proj. 5590; 6.5 mi. U.S. 19 near Price Hill via Cirtsville to Fayette Co. line Rd., State Secondary Proj. 5313, all foregoing Raleigh Co.; 12.8 mi. Pennsboro-Pullman-Berea Rd., State Secondary Proj. 5350, Ritchie Co.; grading, draining, concrete paving 0.528 mi. State Route 25, State Secondary Proj. 6451, Kanawha Co.

Bids Asked June 23

Ill., Waterloo—Monroe Co., spreading 9,630 gal. road tar and 470 tons seal aggregate.

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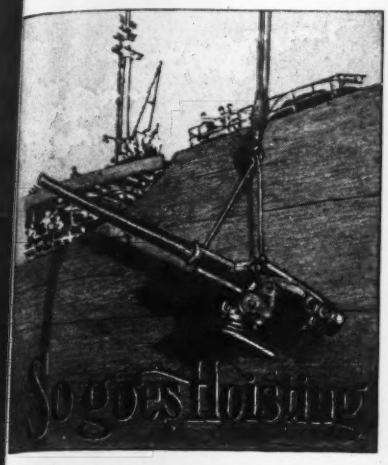

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STREETS AND ROADS (Bids Asked, Cont'd.)

Kansas—State Hy. Dpt., Pratt, resurfacing materials on 23.175 mi. P. 5562, and 20.096 mi. P. 5563, both Barber Co.; 10.136 mi. P. 5565 Barton Co.; 16.437 mi. P. 5570 and 8.749 mi. P. 5571, both Comanche Co.; 3.301 mi. P. 5574 and 5.21 mi. P. 5575 AB, both Cowley Co.; 10.003 mi. P. 5578, Harper Co.; 9.898 mi. P. 5582, Kingman Co.; 5.273 mi. Pratt Co.; 1.384 mi. P. 5592 Reno Co.; 6 mi. P. 5600 AB, Stafford Co.; 7.293 mi. P. 5603 and 4.83 mi. P. 5604, single asphalt surface treating, Sumner Co.; 29.828 mi. P. 5576 AB, Cowley Co.; 6.044 mi. P. 5579 and 16.898 mi. P. 5580 AB, both Harper Co.; 29.905 mi. P. 5587 AB and 3.857 mi. P. 5589, Pratt Co.; 16.056 mi. P. 5601 AB, Stafford Co.; 23.011 mi. 5605 AB, Sumner Co. R. C. Keeling, Topeka, engr.

N. Y., Brooklyn—President Brooklyn Boro, Boro Hall, asphalt (heater method) resurfacing Adelphi, Bridge, Henry and Herkimer Sts., Carlton, Greene and Putnam Aves., Clifton Pl., Lefferts Pl., Washington Park from Myrtle to DeKalb Aves. Bids 6/9 rejected. CD 6/14, under LB.

N. Y., New York—President Manhattan Boro, Municipal Bldg., regulating and 1 in. sheet asphalt on 6 in. concrete repaving, Charles, E. 78, E. 84, W. 87, W. 101, E. 106, E. 107, and W. 107 Sts.; regulating widening, 1 in. sheet asphalt on 6 in concrete repaving E. 41 St.

N. Y., New York—President Bronx Boro, Bronx County Bldg., 851 Grand Cancourse, asphalt block on concrete repaving Oakland Pl., sheet asphalt on concrete repaving Marmion Ave.

Minnesota—State Hy Dpt, St. Paul, bituminous material and aggregate surfacing, 12 mi. S.P. 1301-03 (Trunk Hy. 8-46); 3.1 mi. S.P. 3307-13 (TH 65-5). Plans deposit 55c. each project; 8.5 mi. S.P. 6920-11 (TH 53-11), Plans deposit 35c. Est $25,000 or more ea. (unofficial). O. L. Kipp, ch. engr.

Tex., Pasadena—D. L. Atkinson, mayor, access roads and street imprvs. Plans deposit $30. Garrett Eng. Co., 1806 Milam St., Houston, engrs. CD 4/15—ENR 4/22.

Bids Asked June 30

California—State Div. Hys., Sacramento, plant mix on crusher run surfacing 3.5 mi. hy. between Muir Station and Christie Underpass, 5 mi. hy. between Walnut Creek and Danville, both Contra Costa Co.; shoulder grading and road mix on untreated rock surfacing 6.5 mi. hy. between San Joaquin Co. line and San Andreas, Calaveras Co.; grading, armor coat on crusher run surfacing 4.7 mi. between East Garrison and Route 117, Monterey Co. G. T. McCoy, state hy. engr.

Calif., San Francisco—City, Dpt. P. Wks., City Hall, concrete parking lanes on Mission St. between 20 and 25 Sts. $26,837. Plans deposit $10. J. J. Casey, city engr.

Bids Asked July 1

California—State Div. Hys., State Bldg., Los Angeles, plant mix resurfacing 15.9 mi. hy. between Leucadia and Orange Co. line and between 4.8 mi. southeast of Vista and San Luis Rey River Bridge, San Diego Co. G. T. McCoy, Sacramento, state hy. engr.

Bids Asked

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, dust palliative treatment, Solic 957-Neg-43-319, Woodward Co., Over $25,000.

LOW BIDDERS

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, June 5, road extens., parking areas, No. 91-A, San Diego Co., from Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles, over **$40,000.**

†**California**—U. S. Eng., Wright Bldg., Sacramento, streets, sidewalks, Spec. 579, Fresno Co., from M. W. Stanfield, P. O. Box 230, Marysville, under **$100,000.** CD 6/9.

California—State Div. Hys., Sacramento, June 9, imprv. 16.7 mi. Kern Co., from Griffith Co., 502 Los Angeles Ry. Bldg., Los Angeles, **$104,388**; 8.7 mi. Santa Barbara and San Luis Obispo Counties, from Brown, Doko & Baun, Box 23, Pismo Beach, **$52,496.** CD 5/24—ENR 5/27.

California—State Div. Hys., Sacramento, June 9, imprv. 0.7 mi. San Mateo Co., from Union Paving Co., 212 Babcock Bldg., San Francisco, **$32,321.** CD 5/28.

D. C., Wash.—District Comrs., District Bldg., June 11, resurfacing various concrete roadways, from Donaldson Paving Corp., 12 St. and Brentwood Rd. N.E., **$114,849.**

D. C., Wash.—District Comrs., District Bldg., June 8, repairing about 1,500 cu. yd. concrete roadway and alley pavements and about 8,000 sq. yd. concrete (mixture) from Corson & Gruman Co., 33 and K Sts. N.W., **$32,700;** repairing roadways, from E. B. Donaldson & Bro., 12 St. and Brentwood Rd. N.E., **$64,931.**

D. C., Wash.—District Comrs., District Bldg., June 7, repairing asphaltic pavements, eastern and western sections, from McGuire & Rolfe, 1 and O Sts. S.E., **$117,959** each. CD 6/3.

Indiana—State Hy. Comm., S. G. Hadden, chn., Indianapolis, June 8, imprv. 4.31 mi. Wabash Co., from C. A. Studebaker, Uniondale, **$84,841,** est. $84,430; 2.5 mi. Tibbs Ave. and 0.03 mi. Kentucky Ave., Indianapolis, Marion Co., from Gast Constr. Co., Warsaw, **$166,973,** est. $201,901. CD 5/27—ENR 6/3.

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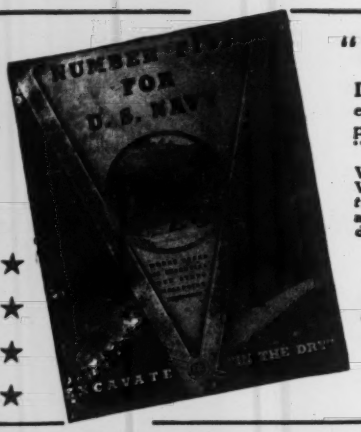

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STREETS and ROADS (Low Bidders, Contracts Awarded)

†**Mississippi**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, June 8, roadway construction for relocating U. S. [illegible], 51, across Coldwater River, Solic. 1106-43-1. De Soto and Tate Counties, from Coo[illegible] Const. Co., Jackson, **$230,852.** CD 5/18—ENR 5/20.

Nebraska—Dpt. Roads & Irrigation, Lincoln, June 10, imprv. 13.9 mi. [illegible]70 B & B, Wayne Pilger, from Yant Constr. Co., 912 S. 45 St., Omaha, **$135,927***4.5 mi. P.242, Alliance-Angora, from Abel Constr. Co., 900 16 St., Lincoln, **$30,595***6.9 mi. P.265 C & D, Whitney-Chadron, from H. W. Johnson, 525 Insurance Exch. Bldg., Sioux City, Ia., **$16,910.** CD 6/4.

N. Y., Kew Gardens—President Queens Boro, Boro Hall, 120-55 Queens Blvd., June 8, imprv. 2nd (Front) St., 51 Ave. and 5 St. from B. Turecamo Contg. Co., Inc., foot of 24 Ave. corn. N.W. Cropsey Lane, Brooklyn, **$32,479.** Est. $18,538. CD 6/1—ENR 6/3.

N. Y., New York—President Manhattan Boro, Municipal Bldg., June 8, imprv. Charles St., W. 147 St., etc., from Del Balso Asphalt Corp., 500 Zerega Ave., **$78,290;** setting, resetting curb, various locations, from Frank Mascali & Sons, Inc., Ft. 111 St. and E. River Dr., **$104,100.** CD 6/3.

N. Y., St. George—President Richmond Boro, Boro Hall, June 9, repaving Avenue B, from Van Bro Constr. Co., 77 Alaska St., West Brighton, Contrs. (A) **$53,383,** (B) $45,135. CD 6/1—ENR 6/3.

★**Pennsylvania**—State Hy. Dpt., J. U. Shroyer, secy., Harrisburg, May 28, imprv. road, Philadelphia and Delaware Counties, from Fred Berlanti & Son, Inc., 15 Oakland Ave., Harrison, N. Y., **$500,810.** CD 5/25—ENR 5/20.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Grant St., west of Westwood St., Mobile, grading, drainage, paving, Montgomery Co., to E. J. & W. L. Cobb Co., Bell Bldg., Montgomery. Est. $40,000. Bids 5/28.

†**Alabama**—U. S. Eng., Grant St., west of Westwood St., Mobile, grading, drainage, resurfacing access. roads, Calhoun Co., to Pitt-Douglas Co., Anniston. Est. **$40,000.** Bids 6/1.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, repairing roads in Northern California, to A. Helwig Constr. Co., 115 S. Main St., Sebastopol. Awarded 6/8.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles 14, Calif., exten. roads and parking areas, No. 91A, San Diego Co., to Daley Corp., 4430 Boundary St., San Diego, under **$40,000.** Awarded 6/7. CD 6/11—ENR 6/17, under LB.

†**Connecticut**—U. S. Eng., Industrial Bldg., Providence, R. I., roads, utilities for bldg., No. 43-253, Hartford Co., to Henley Lundgren Co., 524 River St., Mattapan, Mass. Est. under **$50,000.**

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., roads, NEG-JAX 43-976, Orange Co., to Langston Constr. Co., 115 W. Grant Ave., Orlando, under **$50,000.** Awarded 6/5.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., stabilization and dust palliative parade ground, NEG-JAX 43-974, Lee Co., to Cone & Manly Caesar St. and Cumberland Rd., Tampa, under **$50,000.** Awarded 6/4.

Idaho—Dpt. P. Wks., Boise, road mix bituminous surfacing 8.167 mi. North and South Hy. between Garwood and Atol, Kootenai Co., to Standard Asphalt Paving Co., Inc., Chronicle Bldg., Spokane, Wash., **$30,075.** Bids 6/8.

†**Indiana**—U. S. Eng., 612 Federal Bldg., Louisville, Ky., walks, roads and miscellaneous work, Contr. 559-Eng-6952, Jackson Co., to Birmingham Contracting Co., 208 Hanna Bldg., Birmingham, Mich., under **$50,000.**

Ia., Clinton—Bd. Supervs. Clinton Co., surfacing 42.45 mi. roads, to Clinton Stone Products Co., Clinton, **$52,312.** Bids 6/1. CD 5/21—ENR 5/27.

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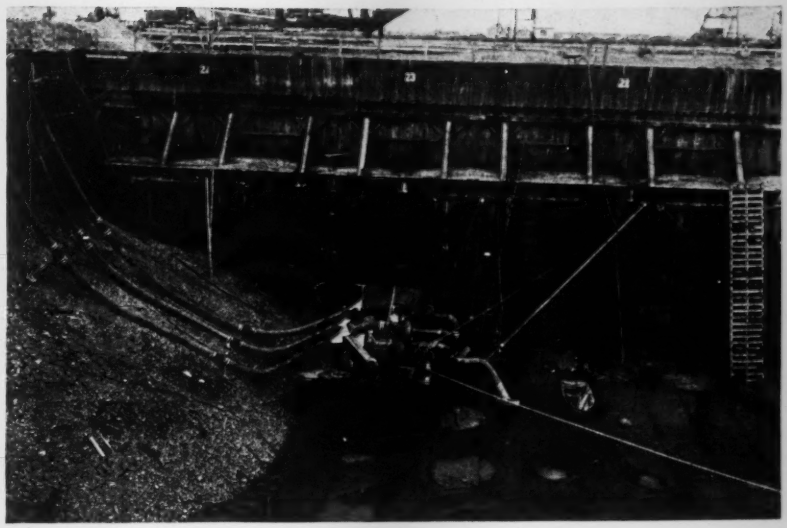

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STREETS and ROADS (Contracts Awarded, Cont'd.)

Ia., Rockwell City—Bituminous resurfacing several streets, to Western Engineering Co., Harlan, **$25,000.**

†Kansas—U. S. Eng., 10 E. 1[illegible] St., Kansas City, Mo., paving, Contr. 461-Eng-1880, Dickinson Co., to Tobin Quarries, Inc., 220 W. 39 St., Kansas City, Mo., under **$50,000.**

La., Monroe—Resurfacing De Soto Rd., Grant-Catalpa and North 4 Sts., to Israel Bros., Monroe. Bids 5/18. CD 5/11.

Md., Baltimore—City Bd. Awards, City Hall, concrete alley paving, Contr. 160, to Paramount Constr. Co., 3700 Gough St., **$33,762.** Bids 6/2. CD 5/25—ENR 5/27.

†Massachusetts—U. S. Eng., 31 St. James Ave., Boston, concrete paving, Nos. 176-43-Neg 340, Middlesex Co., to Vara Constr. Co., 718 Huntington Ave., Boston. Est. under **$50,000.** CD 6/2—ENR 6/10.

†New Jersey—U. S. Eng., 120 Wall St., New York, N. Y., paving roads, Hudson Co., to W. W. Adams, Inc, 11 Central Ave., Tenafly. Est. **$50,000.**

†North Carolina—U. S. Eng., 308 Customhouse, Wilmington, machine graded roads to training aids, Iden. 982-43-223, Richmond Co., to F. D. Cline, Fairview Rd., Raleigh, under **$50,000.** Bids 6/3, awarded 6/3.

†Ohio—U. S. Eng., 522 U. S. Post Office & Courthouse, Cincinnati, drainage, surfacing, Contr. 203-eng-2241, Franklin Co., to General Constr. Co., 337 S. High St., Columbus, **$100,000-$500,000.**

O., Cleveland—F. Foy, city purch. agt., City Hall, cement sidewalks in Northern and Southern Dists., to G. Trinetti, 11909 Lenacorane Ave., **$45,847;** Western Dist., to Shaker Constr. Co., 1716 Preyer Rd., **$25,274.** CD 5/12.

Pa., Pittsburgh—Comrs. Allegheny Co., Court House, concrete paving 1½ mi. Nelson Run Sect. McKnight Rd., Sect. 4, Ross Twp., to McCrady Constr. Co., 304 Ross St., **$315,883.** L. B. Duff, County Office Bldg., engr. CD 5/14—ENR 7/20.

†South Carolina—U. S. Eng., 33 Customhouse, Charleston, road, Contr. 231-Eng-1454, Florence Co., to R. B. Tyler Co., Inc., Monroe, N. C., under **$50,000.**

South Dakota—State Rd. Dpt., Pierre, bituminous treated gravel base course paving 11.75 mi. Fall River Co., to S. S. Roberts Constr. Co., Rapid City, **$115,250;** 7 mi. Bennett Co., to Summit Constr. Co., Rapid City, **$87,948.**

†Tennessee and **Kentucky**—U. S. Eng., 306 U. S. Courthouse, Nashville, roads, Contr. 612-Eng-035, Christian and Trigg Counties, Tenn., and Stewart and Montgomery Counties, Ky., to T. M. Strider & Co., Cotton States Bldg., Nashville, Tenn., **$100,000-$500,000.** CD 4/2—ENR 4/8 under Kentucky and Tennessee.

†Texas—U. S. Eng., Fort Sam Houston, constructing, paving hard standing area, Kinney Co., to W. C. Evans Constr. Co., 1030 Olmos Dr., San Antonio, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, completing unfinished work on access roads, Coryell Co., to Cage Bros. and Palmer & Winters, Bishop, over **$50,000.**

†Texas—U. S. Eng., 416 Wright Bldg., Tulsa, Okla., dust control treatment, Contr. 911-Eng-1887, Dallam Co., to Uvalde Constr. Co., Santa Fe Bldg., Dallas, under **$50,000.**

†Texas—U. S. Eng., Albuquerque, N. M., addnl. dust palliative treatment, Contr. 911-Eng-1974, El Paso Co., to Capital Constr. Co., Santa Fe, N. M., **$100,000-$500,000.**

†Texas—U. S. Eng., Fort Sam Houston, addnl. asphalt paving, Kinney Co., to Rodgers & Stewart, W. Laurel St., San Antonio, under **$50,000.**

†Texas—U. S. Eng., Fort Sam Houston, roads, Bexar Co., to Rogers & Stewart, 1407 W. Laurel St., San Antonio, under **$50,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, surfacing, King Co., to L. Coluccio, 512 21 Ave. S., Seattle, under **$50,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, dust control treatment, Skagit Co., to Foster & Kleiser, 5 Ave. N. and Roy St., Seattle, under **$50,000.**

†Washington—U. S. Eng., 800 3 Ave., Seattle, road construction, Jefferson Co., to Sound Constr. & Eng. Co. and Peter Kiewit Sons, Northern Life Tower, Seattle, **$50,000-$100,000.**

West Virginia—State Rd. Comn., Charleston, imprv. 4.3 mi. Harrison Co., to Parkersburg Ice & Fuel Co., Parkersburg, **$30,979*****7.31 mi. Kanawha Co., to J. M. Francesa & Co., Fayetteville, **$109,129*****7.08 mi. Marion Co., and 3.32 mi. Mineral Co., to Murphy Constr. Co., Morgantown, **$91,704** and **$39,802** respectively. Grand total $271,614.

Newfoundland, St. John's—Municipality, J. J. Mahony, clk., concrete sidewalks, paving roads, day labor, **$30,000.**

Ont., Kitchener—Waterloo Co., C. Stager, clk., resurfacing 28 mi. roads, to A. Cope & Sons, Ltd., 19 Albert St., Hamilton. Est. **$25,000.**

Saskatchewan—Province of Saskatchewan, Regina, reconstructing 14 mi. roadway Sturgis to Freeceville, day labor, **$27,000;** reconstructing 26 mi. hy. Canora to Camsack, day labor, **$36,000.**

Sask., Regina—Municipality, reconstructing 3 mi. streets and avenues, day labor, **$25,000.**

EARTHWORK, WATERWAYS

PROPOSED WORK

N. J., Jersey City—Rejected bids May 4, timber bulkhead and covering Mill Creek. CD 4/30.

★**†Oregon**—U. S. Eng., Pittock Blk., Portland, imprv. Long Tom River channel, below Fern Ridge dam, Lane Co. $750,000.

Tex., Port Neches—Texas Pub. Service Co., c/o Lower Neches Valley Auth., Beaumont and Pt. Neches, enlarging canals and pump. plant facilities. $115,000.

Ont., Amherstburg—Anderdon Twp., Amherstburg, retaining wall along Canard River. $25,000.

Ont., St. Catherines—Dominion Govt., Ottawa, breakwater construction (or weir). $50,000. K. M. Cameron, c/o Dpt. P. Wks., Ottawa, ch. engr.

BIDS ASKED

Bids Asked June 22

N. Y., New York—Comr. Marine & Aviation, Pier A, foot of Battery Pl., North River, dredging slip between Piers 27 and 28, East River. Contr. 2379; dredging slip adjoining east side of Pier 8, East River. Contr. 2382. Plans deposit $1 each set.

Bids Asked June 25

†Louisiana—U. S. Eng., foot of Prytania St., New Orleans, dredging 770,000 cu. yd. material, Mississippi River Levees, Inv. 1096-43-327.

Bids Asked June 29

†Arkansas—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, Miss., approx. 805,000 cu. yd. earthwork, west bank Mississippi River, No. 1106-43-217.

LOW BIDDERS

†Mississippi—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, June 2, 260,000 cu. yd. earthwork, 2,300 cu. yd. drainage ditch excav., Solic. 1106-43-199, Quitman Co., from Cooper & McAdams, West Memphis, Ark., **$50,000-$100,000.** CD 5/18—ENR 5/20.

★**†Mississippi**—U. S. Eng., U. S. Post Office & Courthouse, Vicksburg, June 4, excavating approx. 2,920,000 cu. yd. channel excav. and constructing 2 small earth dams and 1 drainage structure, on Cassidy, Moore, Whiting and Cut-off Bayous, Solic. 1106-43-202, Quitman and Coahoma Counties, from W. E. Callahan Constr. Co., 2034 Moxley St., Dallas, Tex., **$940,125.** CD 5/21—ENR 5/27.

†N. C., Edenton—Dpt. Agriculture, Div. Purchase, Sales & Traffic, 14 St and Independence Ave. S.W., Wash., D. C., June 4,

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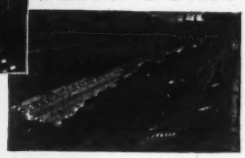

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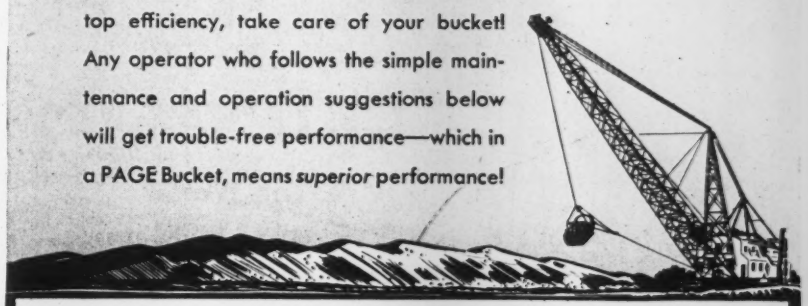

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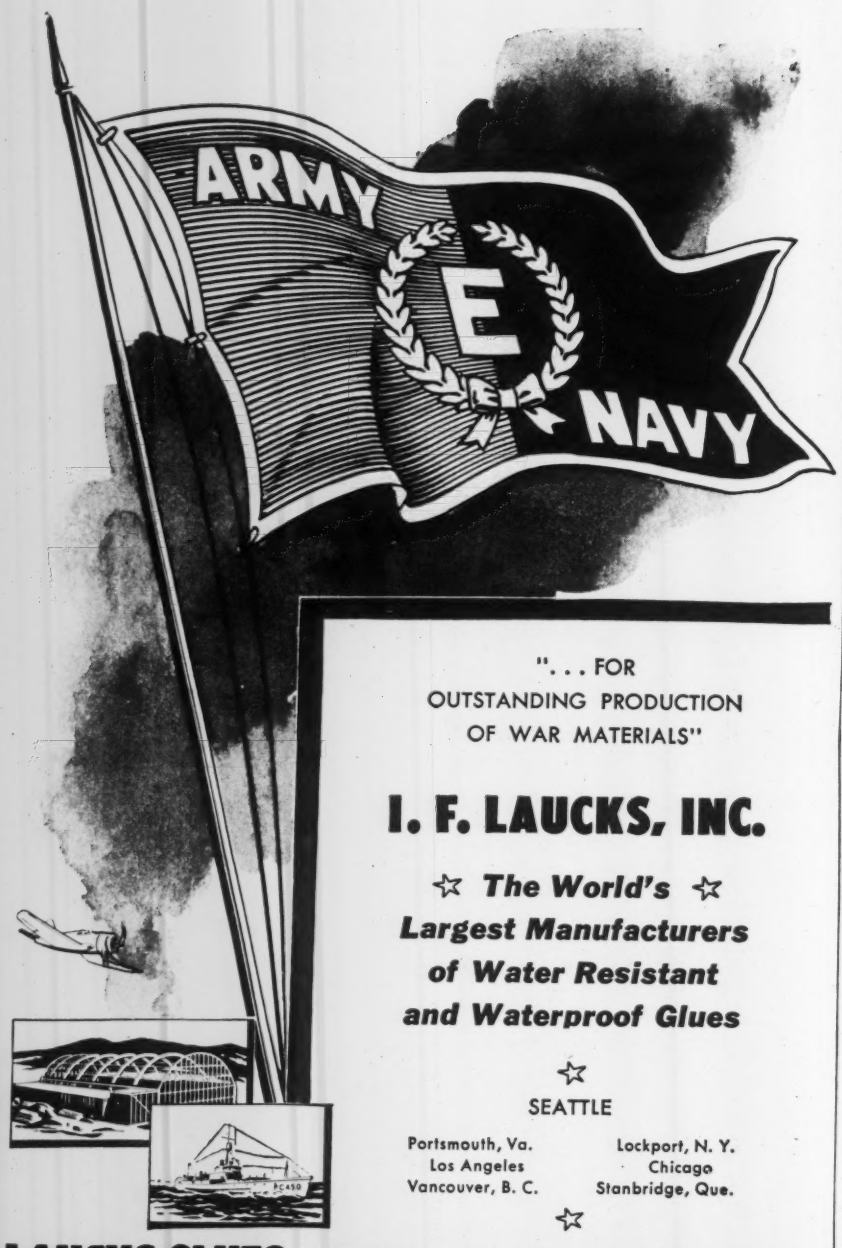

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CONTRACTS AWARDED

†**Ark., McGehee**—War Relocation Auth., ... Gehee, 54 mi. ditching, to W. Trumpecker, Funk, Morehouse, Mo.. $126,124.

†**Florida**—U. S. Eng., 575 Riverside Av... Jacksonville 2, Fla., excavation. Contr. ... Eng-10087, Dixie Co., to C. K. McCaskill, P... ry, under $50,000.

†**Florida**—U. S. Eng., 575 Riverside Av... Jacksonville 2, Fla., excavation. Contr. ... Eng-10104, Lee Co., to The Murphy Con... Co., Clare Ave., West Palm Beach, un... $50,000.

†**Florida**—U. S. Eng., 575 Riverside Av... Jacksonville 2, Fla., dredging. Neg-Jax 43-1... Palm Beach Co., to M. & M. Dredging & Con... Co., Postal Bldg., Miami, Fla., under $50,0... Awarded 6/8.

†**Georgia**—U. S. Eng., Grant St. west ... Westwood St., Mobile, excavation. Contr. ... Eng-5089, Chattahooche Co., to R. H. Wri... & Son, Columbus, under $50,000.

†**Indiana**—U. S. Eng., 612 Federal Bld... Louisville, Ky., excavation and paving. Con... 553-Eng-6972, Allen Co., to Herber & Gre... 3201 S. Lafayette St., Fort Wayne, $100,0... $500,000.

†**New Jersey**—U. S. Eng., 120 Wall St., N... York, N. Y., dolphins, catwalks, Essex ... to Spears, Preston & Burrows, Inc., 50 Chu... St., New York, N. Y. Est. $75,000.

†**Tennessee**—U. S. Eng., 512 Spring St. N.W... Atlanta, Ga., excavation and paving. Con... 2034-Eng-1728, Davidson Co., to H. E. Wi... Co., St. Augustine, Fla., and J. R. Michael ... Co., 1021 Haywood St., Memphis, $100,0... $500,000.

N. B., Saint John—Dominion Govt., Ottaw... Ont., dredging Courtenay Bay, to St. Jo... Dredging Co. Ltd., East St. John St. $102,3... Dpt. P. Wks., Ottawa. Ont., engrs.

UNCLASSIFIED

PROPOSED WORK

Ill., Springfield — IMPROVEMENTS — Ci... election June 28, to vote on construct... imprvs.

Louisiana—OIL WELL—Crow Drilling C... Commercial Natl. Bldg., Shreveport, drilli... developing deep test oil well, Caddo Par... $25,000.

Louisiana—OIL WELL—American Repu... lics Corp., Petroleum Bldg., Houston, Te... drilling, developing test oil well, Lake Char... Area, Beauregard Parish.

La., Lake Charles—OIL WELL—Pure O... Co., Fair Bldg., Fort Worth, Tex., drilli... casing, developing new deep test oil well.

Mass., Hull — ANTENNA HOUSE a... TRANSMITTING STATION — Westinghou... Electric & Mfg. Co., 10 High St., Bost... rejected bids May 17, antenna house a... transmitting station. CD 5/6—ENR 5/13.

New Mexico—OIL WELL—Premier Petr... leum Co., Mt. Olivet Rd., Fort Worth, Te... drilling new oil well, Eddy Co.

★†**New Mexico** — RUNWAYS, etc. — U. ... Eng., Albuquerque, runways, taxiwa... parking aprons, Chaves Co. Approx. $1,000,0...

R. I., Woonsocket—COAL UNLOADIN... FACILITIES—Branch River Woolen C... soon lets contract coal unloading facilit... incl. railway trestle, storage, handling, e... Lockwood-Greene Co., 10 Rockefeller Plaz... New York 20, N. Y., engr. (**Correction**—eng... neer's address.) CD 5/28, under BA.

★**Texas and Michigan**—PIPELINE—Pa... handle Eastern Pipe Line Co., 1315 Uni... Artists Bldg., Detroit, Mich., laying 242 m... 24 and 26 in. steel pipe in 8 loops betwe... Wichita Falls, Tex. and Detroit, Mich. $4,00... 000 or more.

Texas—OIL WELL—General American O... Co., Rep. Bank Bldg., Dallas, drilling, casi... developing about eleven 3,500-ft. oil wel... Crane Co. Over $25,000.

Texas—OIL WELL—Magnolia Petrole... Co., Esperson Bldg., Houston, drilling, casi... developing new deep test oil well, Winkler C...

Texas — OIL WELL — Pan American ... Co., Texas City, staking for drilling ne... 9,500-ft. oil well test, Austin Co.

Tex., Beeville—OIL WELL—United Produ... tion Co., 3969 Leeland St., Houston, drilli... developing deep test oil well.

Tex., Buffalo Springs—OIL WELL—Om... hundro-Continental Oil Co., Fair Bldg., Fo... Worth, staking to drill deep test oil well.

Tex., Carthage—OIL WELL—Smith & Tu... ner, Henderson, drilling, completely develo... ing deep test oil well, Panola Co.

Tex., Edgewood—OIL WELL—Hunt Oil Co... Canton, drilling, developing new 6,500 ft. ... well test.

Tex., Eliasville — OIL WELL — Anderso... Prichard Co., Wichita Falls, drilling, develop... ing 4,900 ft. oil well.

UNCLASSIFIED (Proposed Work, Cont'd.)

Tex., Ella—OIL WELL—Magnolia Petroleum Co., Majestic Bldg., Houston, drilling. developing 6,100 ft. oil well.

Tex., Ganado—OIL WELL—Continental Oil Co., Esperson Bldg., Houston, developing 6,500 ft. oil well.

Tex., Ganado—OIL WELL—G. W. Strauss, Edna, drilling developing new deep test oil well

Tex., Gordonville—OIL WELL—Pure Oil Company, Fair Bldg., Ft. Worth, drilling, casing, developing new 8,000 ft. oil well.

Tex., Jefferson—OIL WELL—J. M. Horne, Jefferson, drilling, developing new deep test oil well

Tex., Loving—OIL WELL—British American O. and P. Co., Wichita Falls and Graham, drilling, developing, 5,600 ft. oil well test.

Tex., Oakville—OIL WELL—Smith & Storey, Inc., Three Rivers, drilling, casing, developing new deep test oil well.

Tex., Pottsboro—OIL WELL—Q. Little & Associates, Madill, Okla., oil well development on a 30,000 acre lease. Over $25,000.

Tex., Roma—OIL WELL—Hagen & Stewart, Rio Grande City, drilling, casing, developing new 1,350 ft. oil well.

Tex., Roma—OIL WELL—Lockhart & Davenport, et al, Milam Bldg., San Antonio drilling, developing new deep test oil well.

Tex., Scotland—OIL WELL—S. D. Johnson, Wichita Falls, drilling, casing, developing 6,500 ft. oil well test. $25,000.

Tex., Wichita Falls—OIL WELL—Consolidated Oil Co., Wichita Falls, drilling, developing new 6,000 ft. oil well.

Tex., Willamar—OIL WELL—C I. Olsen & Associates. Raymondville, drilling, developing oil well.

†Washington—CONSTRUCTION—U. S. Eng., 100 3 Ave., Seattle, construction, Inv. 494A.

B. C., Hardy Bay—WHARF, etc.—Home Oil Co., Ltd, 555 Burrard St., Vancouver, wharf and warehouse.

N. S., Halifax—WHARF, etc.—Municipality, wharf and mine imprvs. $30,000. R. M. MacKinnon, City Hall, comr. of works.

B. C., New Westminster—WHARF—Webb & Gifford Ltd., New Westminster, wharf on Fraser River. $30,000.

Newfoundland, St. John's—POWER DEVELOPMENT—Government of Newfoundland, c/o K. J. Carter, secy. Dpt. Natural Resources, power development, 1943-44. $410,300 voted.

Newfoundland, St. John's—POWER DE-

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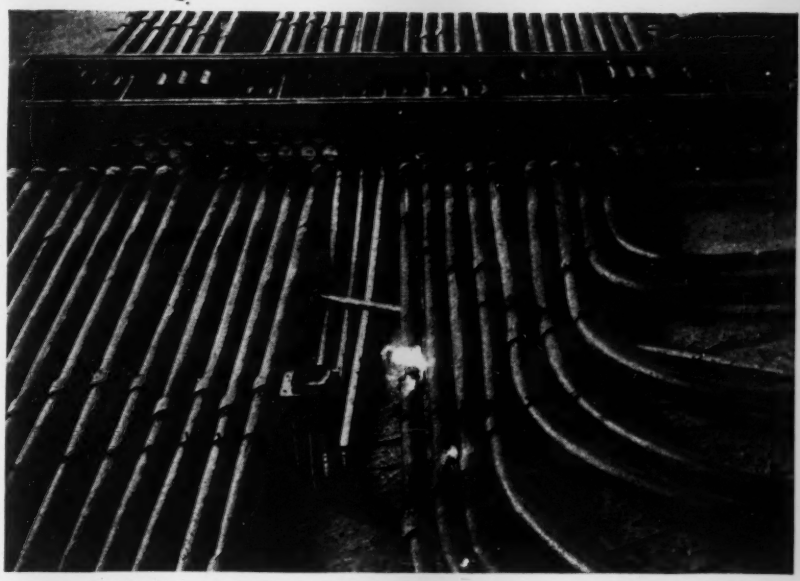

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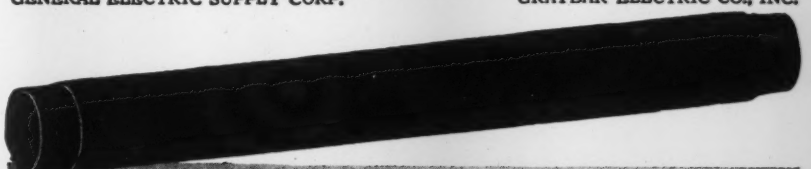

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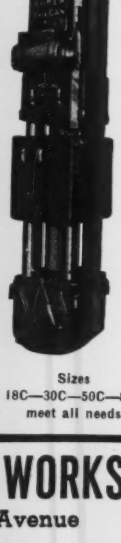
★ It's the sure, hard-hitting blow that counts and the Super-Vulcan gives you twice the blows per minute.

More and more users are depending on Vulcan to get their pile driving requirements done more quickly and get a faster start on construction.

More and more repeat orders tell the story of satisfaction. Users find that they can drive piles faster, easier, and at less cost—get more dependable performance and longer service from their Super-Vulcan Open-Type Pile Hammers.

Rugged strength—simple design—positive action—durability—compactness are all important features.

The open type fits the same leads and uses the same accessories as the Vulcan Single-Acting Pile Hammer.



Sizes 18C—30C—50C—80C meet all needs

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Chicago Illinois

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VELOPMENT—United Towns Electric Co. Ltd., St. John's, addnl. power development.

N. S., Pictou—SHIPYARD—Ferguson Bros., Ltd., shipyard. $50,000.

Ont., Oakville—WATER FRONT IMPROVEMENTS—Municipality, c/o C. H. Byers, clk., water front imprvs., $25,000.

Ont., Parry Sound—DAM—Christie Twp., H. Polkinchorne, clk., dam. $25,000. Pub Utilities Comm., Parry Sound, engrs.

Ont., St. Thomas—ENGINE TERMINAL IMPROVEMENTS—New York Central R. R., J. W. Pfau, ch. engr. (lines Buffalo and east), 466 Lexington Ave., New York, N. Y., imprvs. at engine terminal. $40,000.

Que., Sillery—WALL—Province of Quebec, Quebec City, 700 ft. Masonry and concrete wall along St. Louis Rd. E. Gohier, Dpt. Roads, Quebec City, engr.

BIDS ASKED

Bids Asked June 24

†**N. C., Greenville**—IMPROVEMENTS—Civil Aeronautics Admin., Municipal Air Port, Atlanta, imprvs., clearing, grubbing, dredging, plowing, paving and fencing, $400,000. Plans deposit $10. CD 5/11—ENR 5/13.

Bids Asked

†**Louisiana**—IMPROVEMENTS—U. S. Eng., 300 Bway., Little Rock, Ark., imprvs., grading, drainage, etc., Rapides Parish. CD 6/9.

†**Louisiana**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, Tex., imprvs., Inv. (W-359-43) No. 14, Orleans Parish.

★ †**Mississippi**—IMPROVEMENTS—U. S. Eng., Grant St., west of Westwood St., Mobile, Ala., imprvs., clearing, grading, facilities, Adams Co. $1,500,000. CD 6/1—ENR 6/3.

†**Mississippi**—IMPROVEMENTS—U. S. Eng., Grant St., west of Westwood St., Mobile, Ala., imprvs., Hinds Co.

★ †**South Carolina**—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charleston, imprvs., clearing, grubbing, bldgs., facilities, etc., Orangeburg Co. Over $2,000,000.

★ **Texas** and **Oklahoma**—PIPELINE CARRIER, etc.—Stanolind Pipe Line Co., Philcade Bldg., Tulsa, Okla., and c/o Fair Bldg., Fort Worth, Tex., 383 mi. 16 in. welded joint steel pipeline carrier between Levelland and Lubbock, Tex. areas and Drumwright, Okla. $5,500,000; several pump. stations along route of above pipeline carrier, $1,250,000. CD 4/14—ENR 4/22.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, imprvs., grading, clearing, grubbing, etc., Sol. 359-43-C134 and 359-43-C135, Victoria Co. Plans deposit $50. Bids 6/5 rejected. CD 6/11—ENR 6/17, under LB.

LOW BIDDERS

★ †**Arizona**—IMPROVEMENTS—**U. S. Eng.,** 751 S Figueroa St., Los Angeles 14, Calif., June 3, addnl. imprvs., No. 1311, Mohave Co., from Jacobson & Wikholm, 1614 Wellington Dr., Los Angeles, over **$100,000.**

†**Arizona**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., **Los Angeles 14, Calif.,** June 7, imprvs., No. 1291, Pima Co., from P D O C Co., Luhrs Bldg., Phoenix, Ariz., under **$500,000.**

†**California**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles 14, Calif., June 2, imprvs., roads, surfacing, No. 1318, San Bernardino Co., from Eggleston & Root, P. O. Box 781, San Bernardino, over **$100,000.**

†**California**—UTILITIES—U. S. Eng., Wright Bldg., Sacramento, utilities, Spec. 572, Kern Co., from Griffith Co., 502 Los Angeles Railway Bldg., Los Angeles, under **$150,000.**

†**California**—IMPROVEMENTS—U. S. Eng., Wright Bldg., Sacramento, June 11, imprvs., paving, etc., Spec. 563, San Joaquin Co., from J. A. Casson Co., 22105 Meekland Ave., Hayward, over **$50,000.** CD 6/9.

†**Nevada**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles 14, Calif., June 3, imprvs., No. 1319, Clark Co., from J. E. Burrell & Sons, 518 W. 17 St., Long Beach, Calif., over **$100,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, June 5, imprvs., grading, clearing, grubbing, etc., Sol. 359-43-C134, Victoria Co., from Collins-Bland Co., Austin, **$50,000-$100,000.** CD 6/1.

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Ave. F, Galveston, imprvs., clearing, grubbing, etc., Solic. 359-43-C135 Victoria Co., from McKinney Constr. Co., Victoria, **$100,000-$500,000.**

†**Texas**—IMPROVEMENTS—U. S. Eng., 25 St. and Avenue F, Galveston, June 7, imprvs., Sol. 359-43-C138, Galveston Co., from Jim Handley, Inc., 720 Travis Bldg., San Antonio, **$50,000-$100,000.** CD 6/2.

CONTRACTS AWARDED

†**Arkansas**—IMPROVEMENTS—U. S. Eng., 200 Broadway, Little Rock, June 11, imprvs., repairing roads, Jackson Co., to Lineburger Constr. Co., 2003 Louisiana St., Little Rock, under **$50,000.**

†**California**—GREASE RACK, etc.—U. S. Eng., 74 New Montgomery St., San Francisco, grease rack and paint spray house, San Francisco Co., to Lewis Constr. Co., 516 18 St., Oakland. Awarded 6/7.

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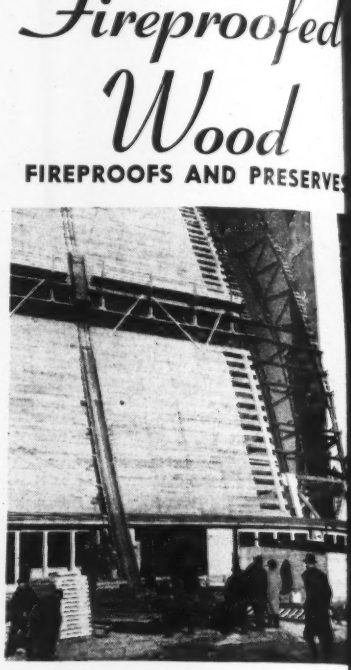

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**California**—IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles 14, Calif., imprvs., No. 1305, San Bernardino Co., to Harvey Adair Constr. Co., 1147 E. Garvey Ave., El Monte, under **$50,000.** Awarded 6/1.

†**California** — IMPROVEMENTS — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., imprvs., NOY 6429, to Bethlehem Steel Co., 20 and Illinois Sts., San Francisco, **$275.000.**

†**California**—SEALING, etc.—U. S. Eng., 74 Montgomery St., San Francisco, application of sealing, stabilization and texture, northern California, to A. Teichert & Son, Inc., Box 2118, Sacramento. Awarded 6/4.

†**Calif., Pt. Molate**—OIL STORAGE FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., Diesel oil storage facilities, NOY 6168, at Naval Fuel Depot, to Walter S. Leland Co., 55 New Montgomery St., San Francisco. **$162,050.**

†**Connecticut**—FIRE ALARM SYSTEM—U. S. Eng., Industrial Bldg., Providence, R. I., automatic fire alarm sys., No. 43-242, Hartford Co., to American District Telegraph Co., 141 Vernon St., Springfield, Mass. Est. under **$50,000.**

†**Delaware**—IMPROVEMENTS—U. S. Eng., Penn & Mutual Bldg., 6 and Walnut Sts., Phila., Pa., imprvs., hardstandings, Contr. 607-eng-4695, New Castle Co., to Brown, Davis & White, Grantville, Pa., under **$50,000.**

†**Florida**—CRASH BOAT STATION—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., crash boat station, NEG-JAX 43-978, Pinellas Co., to Fred Howland, Inc., 1114 Postal Bldg., Miami, Fla., under **$50,000.** Awarded 6/2.

†**Florida**—GRASSING and GRADING—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., grassing, grading scarred areas, NEG-JAX 43-1014, Duval Co., to J. O. Holmes, N. Nebraska Ave. and S. Apex St., Tampa, under **$50,000.** Awarded 6/8.

†**Florida**—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., imprvs., NEG-JAX 43-993, Clay Co., to R. A. Bowen Constr. Co., 917 W. Bay St., Jacksonville, Fla., under **$50,000.** Awarded 6/8.

†**Florida**—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., imprvs., paving aprons, to H. E. Wolfe Constr Co., St. Augustine, Fla., under **$500,000;** clearing, grubbing grading and draining, to Langnot Constr. Co., 115 W. Grant Ave., Orlando, Fla, under **$100,000** both NEG-JAX 43-958, Orange Co. Awarded 5/31.

†**Florida**—SPRIGGING, SEEDING, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., sprigging, seeding, mucking, NEG-JAX

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eliminates cumbersome dead weight and insures a stronger bucket that will wear longer with less breakage and less cost for maintenance. This welded design which has made Williams Buckets so universally used in steel mill service is now featured in all Williams Clamshell and Dragline Buckets. ⅜ to 16½ yd. capacities.

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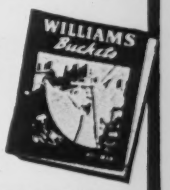

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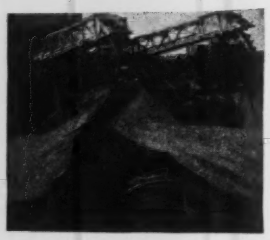

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Slackline Cableway cleans out a tailrace, moving tons of rock from stream to spoil pile.

SAUERMAN Slackline Cableways and Drag Scrapers offer most the satisfactory solutions for material-handling problems requiring machinery that will dig, convey and automatically dump.

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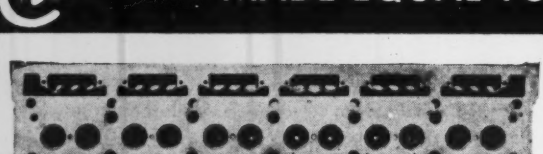

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SPECIALIZED RECONDITIONING

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43-1005, Sarasota Co., to Florida Nurse Landscape Co., Leesburg, Fla., under $10 Awarded 6/8.

†**Florida**—STABILIZING, SPRIGGING, —U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., stabilizing, sprigging, seeding, Neg-43-981, Taylor Co., to Char. R. McCasskill, Perry, under **$50,000.** Awarded 6/5.

†**Florida**—ELECTRICAL INSTALLATI —U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., electrical installations, 436-Eng-9884, Hillsborough Co., to Bigby Electric Co., Inc., 305 Franklin St., Tampa, under **$50,000.**

†**Florida**—FENCE, SHED, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., fence, shed and temporary frame buildings, Contr. Eng-10146, Lake Co., to Steinert Constr. Co., 5027 14 Ave. N.W., St. Petersburg, under **$50,000.**

†**Florida**—MUCKING—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., mucking, Neg-JAX 43-992, Sarasota Co., to G. A. Betz, Sarasota, Fla., under **$50,000.** Awarded 6/7.

†**Florida**—RAILROAD TRESTLE DISMANTLING, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., dismantling and reconstructing railroad trestles, Neg-Jax-43-, Highlands Co., to Okeechobee Constr. Co., Phelps St., Jacksonville (6), under $50, Awarded 6/4.

★†**Florida**—IMPROVEMENTS—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., imprvs., to Brimson Constr. Co., Stovall Bldg., Tampa, and J. L. Cone & J. D. Manley, Cantonment, St. and Cumberland Rd., Tampa, under **$1,000,000;** clearing, grubbing, grading, stabilizing, installing underground ducts, to E. Wolfe Constr. Co., St. Augustine, under **$500,000,** both Neg-Jax-43-959, Hillsborough Co. Awarded 6/3.

†**Florida**—SPRIGGING, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., sprigging, seeding, Neg-Jax-43-933, Dade Co., to Hollywood Farms Co., Inc., Dania, under $100, Awarded 6/3.

†**Florida**—SPRIGGING, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., sprigging, seeding, mucking, NEG-JAX 43-992, Lake Co., to Florida Nursery & Landscaping Co., Leesburg, under **$50,000.** Awarded 6/7.

†**Florida**—SPRIGGING, SEEDING, etc.—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., sprigging, seeding, stabilizing runways, NEG-JAX 43-981, Taylor Co., to C. E. Caskill, Jr., Perry, under **$50,000.** Awarded 6/5.

†**Florida** — SPRINKLER SYSTEM — U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., sprinkler sys. addn., NEG-JAX-43-942, Highlands Co., to Moore Pipe & Sprinkler Co., W. State St., Jacksonville, under **$50,** Awarded 6/3.

†**Georgia**—RAILROAD SPUR—U. S. Engr., Post Office Bldg., Savannah, railroad spur, Contr. 819-eng-1558, Chatham Co., to Dixie Paving & Constr. Co., 108 E. Bay St., Savannah, under **$50,000.**

†**Georgia**—TARGET BUTTS—U. S. Engr., Grant St. west of Westwood St., Mobile, Ala., imprvs., target butts, Contr. 569-eng-3, Chattahoochee Co., to Williams Constr. Co., Columbus, under **$50,000.**

†**Georgia** — ELECTRICAL DISTRIBUTION SYSTEM—U. S. Eng., Post Office Bldg., Savannah, electrical distr. sys., Thomas Co., to White Electric Co., Columbus.

†**Ga., Macon** — IMPROVEMENTS — C Aeronautics Admin., Municipal Airport, Atlanta, imprv. repairs, to W. B. Stewart, Lawton St. S. W., Atlanta, **$25,755.** Bids 6/4. CD 5/25—ENR 5/27.

†**Idaho**—APRON, etc.—U. S. Eng., Pitt Blk., Portland, Ore., apron, appurtenant Contr. 698-Eng-3432, Ada Co., to River Sand & Gravel Co., Box 379, Salem, O **$100,000-$500,000.**

†**Indiana**—TAXIWAYS, etc.—U. S. Eng., Federal Bldg., Louisville, Ky., addnl., ways and grading, Contr. 559-Eng-6 Vanderburgh Co., to Feigel Constr. Corp., Grein Bldg., Evansville, **$50,000-$100,000.**

†**Iowa**—IMPROVEMENTS—U. S. Eng., Jackson St., Omaha, Neb., imprvs., roads, Woodbury Co., to Jensen & Krage, 209 W Bldg., Sioux City, under **$50,000.**

Ia., Des Moines — IMPROVEMENTS — Johnson, city clk., imprvs., armory, to J. Fehn Co., 3120 2 St., **$33,892.** Bids 5/24. N. Nielsen, Hubbell Bldg., archt.

†**Kansas**—OBSTACLE COURSE—U. S. E 10 E. 17 St., Kansas City, Mo., obstacle cou Seward Co., to Peter Kiewit Sons Co., Oma Natl. Bank Bldg., Omaha, Neb. Est. un **$50,000.**

Kan., Wichita—IRPROVEMENTS—Bd. P Comn., imprvs., bldg., to A. W. Soders Constr. Co., 346 N. St. Francis St. Glen Thomas, 125½ N. Topeka St., engr. CD —ENR 3/25.

★†**Louisiana** — RUNWAY, etc. — U. S. E 300 Bway., Little Rock, Ark., runway, t way, grading, drainage, accessory work, Ca Parish, to Weymouth Constr. Co., Dyersb Tenn., over **$1,000,000.**

CLASSIFIED (Contracts Awarded, Cont'd.)

Louisiana—IMPROVEMENTS—U. S. Eng., St. and Avenue F, Galveston, Tex., imprvs., W-345-43 N.O. 14, Orleans Parish, to Brothers Canstr. Co., 2400 Cypress St., Orleans, under **$50,000.** CD 6/9—ENR 17.

Massachusetts — IMPROVEMENTS — U. S. 819 Industrial Trust Bldg., Providence, I. imprvs., 43-249, Hampden Co., to Lane nstr. Co., 37 Colony St., Meriden, Conn. **$50,000-$100,000.** Bids 6/5. CD 6/2.

Michigan—COAL STORAGE YARD—U. S. 700 Union Guardian Bldg., Detroit, coal orage yard, Macomb Co., to Colaid Service rpn., 14365 Ilene St., Detroit, less than 000,000.

Michigan—LIGHTING SYSTEM—U. S. Eng., Union Guardian Bldg., Detroit, exten. port lighting sys., Washtenaw Co., to J. vingston & Co., Inc., 136 Duffield St., Detroit, ss than **$1,000,000.**

Missouri—IMPROVEMENTS—U. S. Eng., E. 17 St., Kansas City, Mo., imprvs., Bu-anan Co., to A. H. Atkinson Paving Co., illicothe, over **$50,000.**

Nebraska—IMPROVEMENTS—U. S. Eng., 9 Jackson St., Omaha, imprvs., frame dgs., Thayer Co., to Lancaster Corp., Stand-rd Oil Bldg., Omaha, under **$100,000.**

Nevada—FLOODLIGHTING—U. S. Eng., O. Box 1270, Kingman, Ariz., floodlighting, c. 1317, Clark Co., to Vancott Electric Co., 4 W. Washington Blvd., Los Angeles, lif., under **$50,000.** Awarded 6/5.

Nevada—GASOLINE STORAGE FACILI-ES—U. S. Eng., 1209 8 St., Sacramento, lif., gasoline storage facilities, Contr. 1105-ng-3016, Nye Co., to J. E. Haddock, Ltd., 5 E. Foothill Blvd., Pasadena, Calif., under 0,000.

New Jersey—FIRE ALARM SYSTEM—U. S. ng., 6 and Walnut Sts., Phila., Pa., installing e alarm sys., Contr. 697-Eng-3880, Burling-n Co., to E. Fred Sulzer & Co. Inc., 27 nion Ave. N., Cranford, under **$50,000.**

New Jersey—HEATING SYSTEM—U. S. ng., 6 and Walnut Sts., Phila., Pa., installing eating sys., Contr. 697-Eng-4697, Monmouth o. to August Arace & Sons, Inc., 642 3 Ave., lizabeth, **$100,000-$500,000.**

New Jersey—SPRINKLER SYSTEM—U. S ng., 120 Wall St., New York, N. Y., installing rinkler sys., Essex Co., to Grinnell Co., 207 arket St., Newark. Est. **$50,000.**

New Mexico — IMPROVEMENTS — U. S ngs., Albuquerque, imprvs., bldgs., Chaves o., to Parks Constr. Co., Construction Bldg., allas, Tex., under **$100,000.** Awarded 6/7.

New Mexico — IMPROVEMENTS — U. S. ng., Albuquerque, imprvs., addnl. bldgs., cilities, Eddy Co., to Marshall Constr. Co., c., 5349 Maple St., Dallas, Tex., under **$100,-00.** Awarded 6/2.

New Mexico — IMPROVEMENTS — U. S. ng., Albuquerque, imprvs., bldgs., addnl. cilities, Lea Co., to Parks Const. Co. Con-ruction Bldg., Dallas, Tex., under **$200,600.** warded 6/2.

New Mexico — IMPROVEMENTS — U. S. ng., Albuquerque, imprvs., addnl. bldgs., cilities, Luna Co., to H. E. Webb Constr. o., Lubbock, Tex., under **$50,000.** Awarded 2.

New Mexico — IMPROVEMENTS — U. S. ng., Albuquerque, imprvs., addnl. bldgs., cilities, San Miguel Co., to H E. Webb onstr. Co., Lubbock, Tex., under **$50,000.** warded 6/2.

New Mexico — IMPROVEMENTS — U. S. ng., Albuquerque, imprvs., bldg., Curry Co., W. T. Davis Constr. Co., Albuquerque, nder **$50,000.**

New York—PLANTING—U. S. Eng., 120 all St., New York, planting, Contr. No. 97-Eng-4068, Suffolk Co., to Peter Mitchell, c. and D. T. Small Contractors, Inc., ackett Bldg., Greenwich, Conn., **$100,000-500,000.**

North Carolina—FIRE ALARM SYSTEM—S. Eng., 308 Customhouse, Wilmington, tomatic coded fire alarm sys., Iden. 982-3-212, New Hanover Co., to American District lephone Co., 145 E. Bay St., Charleston, nder **$50,000.** Bids 5/29, awarded 6/1.

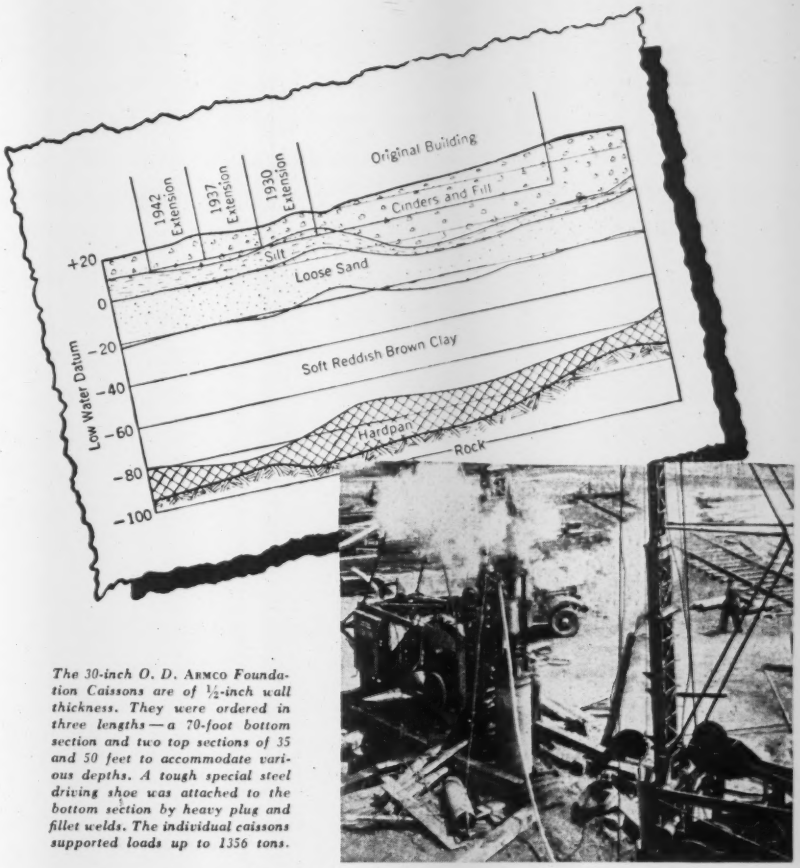
North Carolina—TRAINING AIDS—U. S. ng., 308 Customhouse, Wilmington, training ds, Iden. 982-43-215, Richmond Co., to Lee nstr. Co., 422 S. Church St., Charlotte. ids 5/24.

North Carolina—IMPROVEMENTS—U. S. ng., 308 Customhouse, imprvs., repairing, alling, paving, Iden. 982-43-318, Wake Co., F. D. Cline, Fairview Rd., Raleigh, under 0,000. Bids 5/27, awarded 5/28.

N. C., Kinston—CLEARING, etc.—Civil Aeronautics Admin., Hapeville, Atlanta, a., clearing, grubbing, draining, paving, eeding, etc., to R. B. Tyler Co., 1446 Levering t., Louisville, Ky., **$616,807.** Bids 6/4. CD 6/8—NR 6/10 under L.B.

Ohio—PARKING SPACE—U. S. Eng., 700 nion Guardian Bldg., Detroit, Mich., parking ace, Allen Co., to H. J. Meier, Lima, less an **$1,000,000.**

Oklahoma—IMPROVEMENTS—U. S. Eng., W. Main St., Denison, Tex., imprvs., sphalt paving, Kiowa Co., to Texas Bitulithic o., 111 Commerce St., Dallas, Tex., **$100,000-500,000.**



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ENR-6-17-43

UNCLASSIFIED (Contracts Awarded, Cont'd.)

†Oklahoma—IMPROVEMENTS—U. S. Eng., 416 Wright Bldg., Tulsa, imprvs., bldgs., Oklahoma Co., to Bush Const. Co., 3500 W. Reno St., Oklahoma City. Est. under **$100,000.**

†Oklahoma—IMPROVEMENTS—U. S. Eng., 231 W Main St., Denison, Tex., imprvs., asphalt and concrete paving, to Texas Bitulithic Co., 111 Commerce St., Dallas, Tex., **$100,000-$500,000***** drainage work, to J. Parrott, 403 Haskell St., Dallas, Tex., **$50,000-$100,000***** grading work, to Bradford & Smith, Haskell, Tex., **$50,000-$100,000,** foregoing in Jackson Co.

★**†Okla., Stillwater** — IMPROVEMENTS — Civil Aeronautics Admin., Box 1689, Fort Worth, Tex., imprvs., seeding, Schedule 2-A, to Texas Bitulithic Co., 111 Commerce St., Dallas, Tex., **$588,194.** CD 6/7, under LB—ENR 5/13.

†Oregon — STORAGE FACILITIES — U. S. Eng., Pittock Blk., Portland, storage facilities, Contr 698-Eng.-3417, Deschutes Co., to Halvorson Constr. Co and E. B. Halvorson, Salem, under **$50,000.**

†South Carolina—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charlotte, imprvs., water dist. addns., Greenville Co., to Boyle Constr. Co, Sumter. Bids 6/4.

†South Carolina—IMPROVEMENTS—U. S. Eng., 33 Customhouse, Charlotte, imprvs., Greenville Co., to Boyle Constr. Co., Sumter. Bids 6/7.

†Tennessee — LIGHTING SYSTEM — U. S. Eng., Grant St. west of Westwood St., Mobile, Ala., lighting sys., Shelby Co., to E. W. Cook Electric Co., 513 E. Capitol St., Jackson, Miss., under **$100,000.**

†Tennessee—TOWER—U. S. Eng., Grant St., west of Westwood St., Mobile, Ala., tower, Shelby Co., to Henderson, Black & Greene Mill Co., Troy, Ala., under **$200,000.**

Tenn., Murfreesboro — IMPROVEMENTS — City, c/o S. Cox, imprvs., bldgs., to Bell Brothers, Murfreesboro, Est. about **$100,000.** Warfield & Keeble, Nashville Trust Bldg., Nashville, archts.

†Texas—GASOLINE STORAGE FACILITIES—U. S. Eng., 231 W. Main St., Denison, gasoline storage facilities, Contr. 257-Eng-2315, Tarrant Co., to Fort Worth Structural Steel Co., 2400 W 7 St., Fort Worth, under **$50,000.**

†Texas—GROUNDS DEVELOPMENT—U. S. Eng., 25 St. and Avenue F, Galveston, grounds development, seeding, turfing, etc., McLennan Co., to Sanders, Swain & Smith, Arlington, under **$50,000.**

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., Bexar Co., to R. W. Briggs & Co. and M. B. Killian, Sunset Rd., San Antonio, **$100,000-$500,000.**

†Texas—IMPROVEMENTS—U. S. Eng., Fort Sam Houston, imprvs., Webb Co., to H. B. Zachry Co., P. O. Box 596, San Antonio, under **$50,000.**

†Texas—RAILWAY SPUR TRACKS—U. S. Eng., Fort Sam Houston, addnl. railway spur tracks, Kinney Co., to Martin & Grace, 711 Rio Grande Life Bldg., Dallas, under **$50,000.**

†Texas—SODDING, etc., U S. Eng., Fort Sam Houston, grounds development, sodding, etc., Bell Co., to Holland Page, Georgetown Rd., Austin, under **$50,000.**

Tex., Mt. Pleasant — OIL WELL — Harry Moss & Associates, Mt. Pleasant, drilling, developing 8,000 ft. oil well, to Delaney Drilling Co., Pittsburgh, approx. **$30,000.**

†Tex., Rockport — IMPROVEMENTS — Civil Aeronautics Admin., Box 1689, Fort Worth, Schedule 2, imprvs., to Heldenfels Bros., Rockport, **$467,115.** Additional to CD 4/28—ENR 5/6, under CA.

†Utah—IMPROVEMENTS—U. S. Eng., 32 Exchange Pl., Salt Lake City, imprvs., Weber Co., to G. A. Whitmeyer & Sons Co., 2759 Grant Ave., Ogden, under **$88,000.** Bids 6/1.

†Virginia—PLANTING—U. S. Eng., 1 and Douglas St. N.W., Wash., D. C., planting, Contr. No. 977-Eng-1774, Augusta Co., to Greenbrier Farms, Inc., Great Bridge Rd., Norfolk, under **$50,000.**

†Va., Chincoteague—PARKING AREA, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., addnl. paved parking area and completion gasoline storage, NOY 6308, to Virginia Engineering Co., Inc., 330 28 St., Newport News, **$129,000.**

†Washington—CLEARING—U. S. Eng. 800 3 Ave., Seattle, clearing, King Co., to General Constr. Co., 3840 Iowa St., Seattle, under **$50,000.**

†Washington—STORAGE FACILITIES—U. S. Eng., 800 3 Ave., Seattle, storage facilities, Contr. 869-Eng-10133, King Co., to Henrik Valle Co., 407 3 Ave. W., Seattle, under **$50,000.**

†Washington—STORAGE TRACKS—U. S. Eng., 800 3 Ave. Seattle, addnl. storage tracks, Inv. 572, Snohomish Co., to Ross Constr. Co., 4554 Thackeray Pl., Seattle, under **$50,000.** CD 6/4—ENR 6/10.

†Washington—WATERPROOF COVERING—U. S. Eng., 800 3 Ave., Seattle, installing waterproof covering, Spokane Co., to Asbestos Supply Co., 10 Bernard St., Spokane, under **$50,000.**

N. S., Halifax—SHIPWRIGHT'S BLDG.—Halifax Shipyards Ltd., Barrington St., shipwright's bldg., to Standard Const. Co. Ltd., 101 Upper Water St., about **$40,000.** C. A. Fowler & Co., Capitol Bldgs., Barrington St., archt.

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LASSIFIED (Contracts Awarded, Cont'd.)

Toronto—DOCK REPAIRS—National Corp., Ltd., 324 Cherry St., Toronto, repairs, foot of Cherry St., incl. 650 d concrete, 5,600 lin. ft. piling, etc., to ll Constr. Co., Ltd., 501 Harbour Com-ner's Bldg., **$30,000.** James, Proctor & ton, Ltd., 36 Toronto St., engrs.

k. Davidson — IMPROVEMENTS — Dpt. nal Defense (Air), Ottawa, Ont., imprvs. F. T. School, to Bird Const. Co. Ltd., Smith Sts., Regina, **$85,000.**

LATIN AMERICA

ador, Quito—Ministry of Public Works, will award prizes totalling 120,000 or $8,500 in American currency, for designs for new legislative building. cost 15,000,000 sucres or approx. $1,000,-

ico—Department of Navy, Mexican Fed-Government, Mexico City, taking bids shipyard and dock construction, state **ra Cruz**, $2,500,000. CD 6/2.

ico—Dpt. Federal Pub. Wks., Mexico and State of Vera Cruz, Vera Cruz, addnl. seawall, force account, $600,000. CD -ENR 6/10.

ico—Mexican Government, National Ir-ion Comn., President Manuel Avila acho has authorized building irrigation **San Buenaventura**, Chihuahua State, ico; Vicente Villasana, organized a com-Espectaculos, S.A., Tampico, Tamps., o, that has purchased Tampico's leading as and will modernize them, also plans ng 3 other cinemas and contemplates ucting state theatre at the port, ico, Tamaulipas State, $100,000 (each inema).

ico, Mexico City—Goodyear Tire & er Co., 1144 E. Market St., Akron, O., and pania Hulera Oxo, Mexico City, taking constructing rubber factory for manufac-of tires and other rubber articles. 000.

ico, Mexico City—Dpt. Federal Public s & Communications, Mexico City, plans Federal District Palace bldg. $1,450,000. itect, c/o Federal Dept. Public Bldgs ing, Mexico City.

ico, Vera Cruz—City, taking bids munic-market. CD 6/3—ENR 6/10.

PUBLIC BUILDINGS

POSED WORK

labama—Pub. Housing Auth., NHA, rgia Savings Bank Bldg., Peachtree and d Sts., Atlanta, Ga., plans by C. H. Mc-ey, Jackson Bldg., Birmingham, dormi-units, Ala. 1207. CD 5/20—ENR 5/27.

labama—Rheem Manufacturing Co., South Calif., plant facilities. $350,000. De-e Plant Corp. will finance.

la., Anniston—Federal Works Agency, Post Office Bldg., Montgomery, revised s by C. N. McCauley, Jackson Bldg., ingham, hospital bldg., Ala. 1-115. 000. Bids 6/3 rejected.

rizona—Goodyear Aircraft Corp., Akron, ddnl. plant facilities, $450,000. Defense t Corp. will finance.

alifornia—Pub. Housing Auth., NHA, 785 ket St., San Francisco, bids in 1 week, ntory units, Calif. 4694, Calif. 4695 and 4702, and units, Calif. 4712. J. J. Dono-950 Parker St., Berkeley, archt. CD —ENR 4/22.

alifornia—Yards & Docks, Navy Dpt., 18 nd Constitution Ave. N.W., Wash., D. C., s, walks, roads. $325,000.

California—Pub. Housing Auth., NHA, 785 Market St., San Francisco, bids in t 6 weeks, family dwelling units, Calif. and Calif. 4721. A. T. Hass, 525 Market San Francisco, and C. I. Warnecke, 1700 ncial Center Bldg., Oakland, archts. CD —ENR 4/22.

alifornia—Pub. Housing Auth., NHA, 785 ket St., San Francisco, family trailer , Calif. 4723.

alif., Selby—Pub. Housing Auth., NHA, Market St., San Francisco, family dwell-units, Calif. 4723.

alif., San Jose—Pub. Housing Auth., NHA, Market St., San Francisco, 150 unit family ing, conversion program.

olo., Colorado Springs—Pub. Housing , NHA, Dierks Bldg., 1006 Grand Ave., sas City, Mo., 75 unit family housing, ersion program.

onn., Fairfield—Pub. Housing Auth., NHA, School St., Boston, Mass., bids soon recrea-bldg., firehouse, Conn. 6071. Fletcher mpson, Inc., 211 State St., Bridgeport, and archt.

elaware—U. S. Eng., Lewes, bids soon and tower, Sussex Co. $50,000-$100,000.

ansas—Pub. Housing Auth., NHA, Dierks , 1006 Grand Ave., Kansas City, Mo., houses, and converting existing struc-

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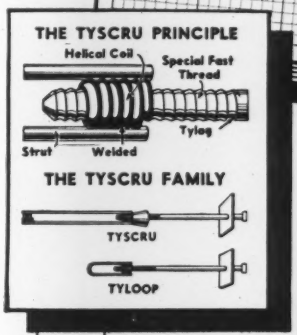

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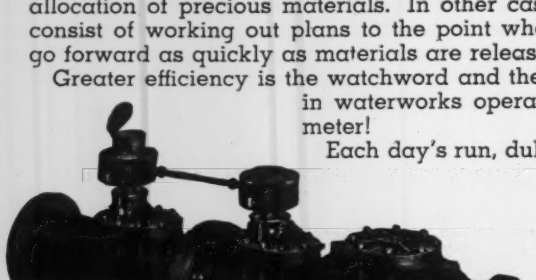

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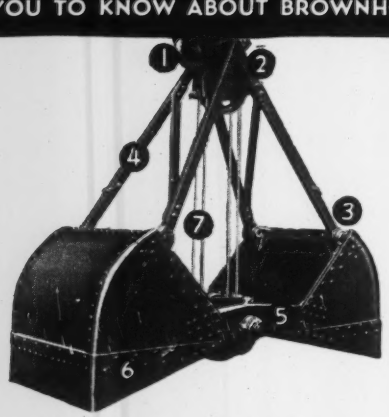

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PUBLIC BLDGS. (Proposed Work, Const

†**Kentucky**—Pub. Housing A... NHA, E. 9 St., Cleveland, O., plans ... Wilson & Watkins, 145 E. High St., L... tory housing, Ky. 15106. CD ... ENR 5/27.

†**Kentucky**—Pub. Housing A... NHA, E. 9 St., Cleveland, O., plans ... Wilson & Watkins, 145 E. High St., L... porary family dwelling hous... Ky. ... CD 5/19—ENR 5/27.

†**Louisiana**—Standard Oil C... of Louisiana, North Baton Rouge, addnl. ... facilities, ... for synthetic rubber produc... etc. ... $440,000 authorized. Defense ... Corp. finance.

†**La., New Orleans**—Pub. Housing A... NHA, 1205 Electric Bldg., 7 ... Taylor ... Fort Worth, Tex., 500 unit family hou... conversion program.

Maryland—Park & Planning Comn., S... Spring, sketches made recreation fiel... parks and parkways, Montgomery and P... Georges Counties. Plans application to F...

†**Michigan**—Pub. Housing Auth., NHA, S... E. 9 St., Cleveland, O., plans by Herma... Simons, Lafayette Bldg., Detroit, trailer h... ing, MI 20197 CD 5/21—ENR 5/27.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 300 unit fa... housing. Mich. 20191.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 150 unit fa... housing. Mich. 20088.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 350 unit fa... housing. Mich. 20115.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 940 unit fa... housing. Mich. 20141.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 500 unit fa... housing. Mich. 20188.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 250 unit fa... housing. Mich. 20189.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 200 unit fa... housing. Mich. 20190.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 310 unit fa... housing. Mich. 20198.

†**Mich., Detroit**—Pub. Housing Auth., N... 2073 E. 9 St., Cleveland, O., 20 unit fa... housing. Mich. 20199.

†**Missouri**—Pub. Housing Auth., NHA, D... Bldg., 1006 Grand Ave., Kansas City, ... Indefinitely postponed bids to have ... opened June 7, community bldg. and ... school bldg. for housing, Project Mo. 2... G. S. Russell, 233 Roosevelt Hotel Bldg., ... Delmar Blvd., St. Louis 8, Mo., engr. ... archt. CD 6/2—ENR 5/6.

†**Missouri**—U. S. Eng., 10 E. 17 St., K... City, Mo., bldg., Buchanan Co., under $5...

†**Mo., Mexico**—Pub. Housing Auth., N... Dierks Bldg., 1006 Grand Ave., Kansas ... Mo., 23 unit family housing, conversion ... gram.

†**Nebraska**—Pub. Housing Auth., N... Dierks Bldg., 1006 Grand Ave., Kansas ... Mo., plans by L. A. Daly, 556 Insurance B... Omaha, family housing. CD 5/19—ENR ...

†**New Jersey**—Pub. Housing Auth., N... 270 Bway., New York, N. Y., plans by J. ... Van Nuys, State Hy. 31, Somerville, dor... tory unit housing. N.J. 28160.

†**New Jersey**—Pub. Housing Auth. NHA, ... Bway., New York, N. Y., plans by L. V. Po... man, 1140 E. Jersey St., Elizabeth, comma... bldg. NJ28051.

†**N. J., Elizabeth**—Pub. Bldgs. Admin., ... and F Sts. N.W., Wash., D. C., nurses tr... ing school addn. at Elizabeth General H... pital. **FWA.** CD 3/9—ENR 3/11.

†**New Mexico**—U. S. Eng., Albuquer... bldg., Berralillo.

†**New Mexico**—U. S. Eng., Albuquer... bldg., San Miguel Co. Under $100,000.

†**New Mexico**—U. S. Eng., Albuquer... bldg., facilities, etc., DeBaca Co. Over $50,...

★†**N. C., Burlington**—Federal Works Age... Candler Bldg., Atlanta, Ga., general h... pital. $500,000.

†**Ohio**—Goodyear Tire & Rubber Co., ... E. Market St., Akron, mezzanine floor ... plant. $250,000. Defense Plant Corp. ... finance. J. Gordon Turnbull Co., 2630 Che... Ave., Cleveland, engrs.

†**Ohio**—Pub. Housing Auth., NHA, 2073 ... 9 St., Cleveland, plans by Britsch & Mun... Nicholas Bldg., Toledo, temporary fam... dwelling housing, Ohio 33265. CD 5/... ENR 5/27.

†**Ohio**—Pub. Housing Auth., NHA, 2073 ... 9 St., Cleveland, plans by Associated Arc... tects, First Central Tower, Akron, 240 ... trailer housing, Ohio 33264. CD 5/19—E... 5/27.

★†**Ohio**—Pub. Housing Auth., NHA, 2073 ... 9 St., Cleveland, plans by Potter, Tyle... Martin, 35 E. 7 St., Cincinnati, tempor... family dwelling unit housing, Ohio 33... CD 6/3—ENR 6/10.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Ohio**—Pub. Housing Autn., NHA, 2073 E. 9 St., Cleveland, plans by Dayton Housing Architects, Third Natl. Bank Bldg., Dayton, temporary family dwellings, Ohio 33252, plans by Triangle Associates, 4614 Prospect Ave., Cleveland, temporary family dwellings, Ohio 33269.

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St, Cleveland, plans by Garfield, Harris Robinson & Schafer, National City Bank Bldg., Cleveland, permanent housing, Ohio 33261. CD 5/6—ENR 5/13.

★†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, plans by Garfield, Harris, Robinson & Schafer, National City Bank Bldg., Cleveland, permanent housing, Ohio 33262. CD 5/6—ENR 5/13.

O., Akron—Akron City Hospital, T. B. Tomkinson, pres., 525 E. Market St., plans nearing completion by Good & Wagner, 1st Central Tower Bldg., 1 story, bsmnt., 46x175 ft. brick, rein.-con. hospital $410,000. Arthur E. Rowe, 1900 Euclid Ave., Cleveland, structural engr.

Okla., Lawton—City, R. E. Glenn, mayor, plans by W. B. Hendrick, Lawton, health center, facilities. Applying to FWA.

†**Oregon**—Pub. Housing Autn., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., trailer housing units.

†**Oregon**—Pub. Housing Auth., NHA, Skinner Bldg., 5 Ave. and Union St., Seattle, Wash., plans by R. L. Morin, Public Service Bldg., Portland, remodeling housing. $125,000.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., plans by Silverman & Levy, 1700 Sansom St., Phila., community and commercial bldgs., Pa. 36251.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., plans by E. H. Wigham, 315 S. 15 St., Phila. housing, Pa. 36434. CD 6/10.

†**Pennsylvania**—U. S. Eng., Transfer, bldgs., Mercer Co. Gannett, Eastman & Fleming, Transfer, engrs.

†**Pa., Coatesville**—Pub. Housing Auth., NHA, 270 Bway, New York, N. Y., 100 unit family housing, conversion program.

★†**Pa., Lebanon**—Veterans Admin., Vermont Ave., between H and I Sts. N.W., Wash., D. C., hospital bldg. $2,000,000. CD 3/17—ENR 3/25.

†**South Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg. Peachtree and Broad Sts., Atlanta, Ga., plans by A. E. Constantine, 149 Calhoun St., Charleston, trailer housing, SC 38077. CD 5/19—ENR 5/27.

†**South Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., plans by J. B. Urquhart, Palmetto Bldg., Columbia, housing, SC 38078. CD 5/19—ENR 5/27.

†**South Carolina**—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg. Peachtree and Broad Sts., Atlanta, Ga., plans by A. E. Constantine, 149 Calhoun St., Charleston, housing, SC 38079. CD 5/20—ENR 5/27

†**South Carolina**—Metals Reserve Co., 811 Vermont Ave. N.W., Wash., D. C., aluminum mfg. plant. $2,500,000.

†**Tex., Grand Prairie**—Bd. Educ., plans by M. Lemmon, Tower Petroleum Bldg., Dallas, school bldg., Tex 41-607. $150,000. **FWA.**

†**Tex., San Angelo**—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, 16 unit family housing, conversion program.

Tex., San Antonio—G. G. Mauermann, mayor, plans by A. B. Ayres, Transit Tower Bldg., electric power plant imprvs., alterations, Presa and Villita Sts.

†**Utah**—Pub. Housing Auth., NHA. Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., frame community and administration bldgs., Utah 42043. Burns & McDonnell, 107 W. Linwood Ave., Kansas City, Mo., engrs. and archts.

Va., Lynchburg—Bd. Directors State Hospitals, State Hospitals, Richmond, plans by S. S. Johnson, Allied Arts Bldg., gymnasium bldg. $150,000.

★†**Washington**—U. S. Eng., 800 3 Ave., Seattle, military installations, King Co. Over $5,000,000

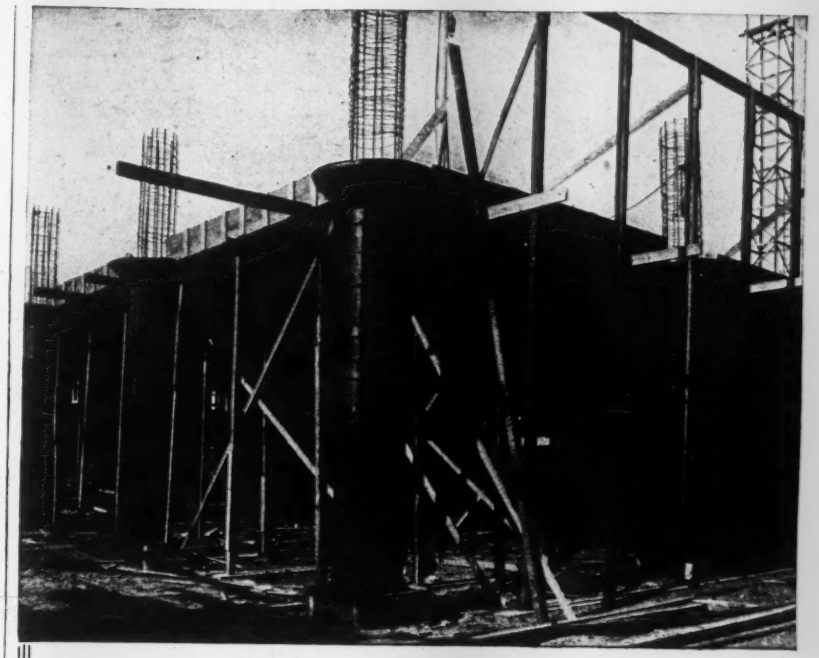
†**Washington**—Seattle Housing Autn., 825 Yesler Way, Seattle, temporary frame structure with dormitory sleeping quarters, cafeteria and community hall, for NHA. $200,000.

†**Wasnington**—U. S. Eng., 800 3 Ave., Seattle, military housing. Invs. 571 and 580, bldgs., Invs. 574, 579, 583 and 576.

★†**Wis., Beloit**—City Hospital Bd., Beloit, plans by P. W. Swern, 19 S. La Salle St., Chicago, Ill., altering and constructing brick, rein.-con. hospital addn., alterations. $391,500. **FWA.**

Wis., Marshfield—E. H. Olson, city clk., 1 story, 70x98 ft., brick garage, concrete fdn. Helmick, Edeskuty & Lutz, 412 Essex Bldg., Minneapolis, Minn., engrs.

†**Wyoming**—Pub. Housing Auth., NHA. Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., housing.



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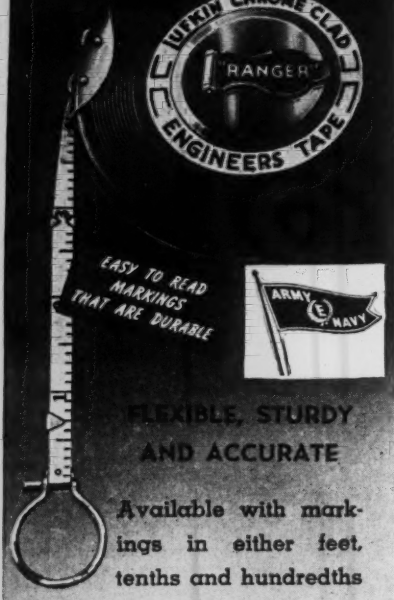

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

Alta., Edmonton—Secy. Dpt. P. Wks., Ottawa, Ont., bids soon, 2 hospital pavilions, H-shaped, 3 story, 115x240 ft., brick, at University Military Hospital, Edmonton South. $325,000. CD 5/24—ENR 5/27.

B. C., Esquimalt—Wartime Housing, Ltd., 55 York St., Toronto, Ont., bids soon 100 addnl. houses. $350,000. McCarter & Nairne, 1930 Marine Bldg., Vancouver, archts. CD 6/7—ENR 6/10.

B. C., Vancouver—Dominion Govt., Ottawa, Ont., remodeling 50 dwellings into 4 unit apartments. $250,000. Architect, c/o Housing Admin., Dpt. Finance, Ottawa, Ont.

Man., St. Boniface—Municipality, 100 dwellings. $300,000.

Newfoundland, Corner Brook—Pub. School Com., Corner Brook, school. $150,000.

★ **Newfoundland, St. John's**—Government of Newfoundland, R. Manning, secy. P. Wks., public building construction 1943 and 44. $674,500 voted. Dpt. P. Wks., St. John's, engrs.

Ontario—Dominion Govt., Ottawa, used airplane oil refining plant.

Ont., Ottawa—Wartime Housing Ltd., 55 York St., Toronto, converting several large houses into apartments, $200,000.

Ont., Toronto—Municipality, remodeling 59 houses into 4-family dwellings, south of Bloor and east of Yonge Sts. $250,000.

Que., Plessisville—School Comn., c/o P. A. Painchaud, Plessisville, plans by J. B Gagnon, 324 Notre Dame St., Thetford Mines, 3 story, bsmt. 60x150 ft. trades school, rein.-con. fdn. $150,000.

Que., Three Rivers—Province of Quebec, Quebec City, plans remodeling disused paper mill into paper making scheme. Dpt. P. Wks., Quebec City, archts.

BIDS ASKED

Bids Asked June 21

†**Rhode Island**—U. S. Eng., 819 Industrial Trust Bldg., Providence, (selected list bidders) observation station, etc., Newport Co.

Bids Asked June 22

†**Va., Arlington**—Pub. Bldgs. Admin., North Interior Bldg., general construction, health center, Project Va. 44279. $168,000. **FWA.** CD 4/28—ENR 11/12.

Bids Asked June 23

†**South Carolina**—U. S. Eng., 308 Customhouse, Wilmington, N. C., bldg., (Type RBET), Greenville Co. Plans deposit $25.

Bids Asked June 28

†**Michigan**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., temporary family dwellings, Mich. 20181. Plans deposit $50 (refunded). E. M. Smith, Murphy Bldg., Highland Park, archt. CD 5/20—ENR 5/27.

Bids Asked June 29

†**S. C., Beaufort**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., D. C., Beaufort County Hospital. **FWA.** Tentative date. H. S. Singley, 1508 Washington St., Columbia, archt. CD 6/11.

Bids Asked June 30

†**Kansas**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., 100 unit temporary housing, L. Schmidt, 1832 E. 2 St., Wichita, archt.-engr. CD 6/2—ENR 6/10.

†**Kansas**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., temporary family housing. L. Schmidt, 1832 E. 2 St., Wichita, engr.-archt. CD 6/2—ENR 6/10.

†**Kansas**—Pub. Housing Auth., NHA, Dierks Bldg., 1006 Grand Ave., Kansas City, Mo., temporary family housing. L. Schmidt, 1832 E. 2 St., Wichita, engr.-archt. CD 6/2—ENR 6/10.

Bids Asked July 1

O., Medina—Medina Community Hospital, Inc., hospital alterations, addns. $157,000. Plans deposit $25. Garfield, Harris, Robinson & Schafer, 915 National City Bldg., Cleveland, archt.

Bids Asked

†**Massachusetts**—U. S. Eng., 31 St. James Ave., Boston, (selected list bidders), bldg. addn. alterations, No. 175-43-Neg-359, Middlesex Co., under $50,000.

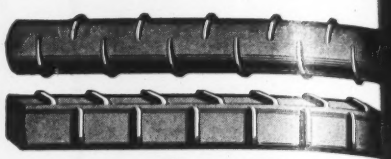
†**New Mexico**—U. S. Eng., Albuquerque, bldgs., facilities, Chaves Co.

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, Moore General Hospital addn., Buncombe Co. Plans deposit $25. Six Associates, Inc, Charlotte, archts.

†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, (selected list bidders) trailer housing, OH 33254. Maier, Outcalt & Associates, 13124 Shaker Square, Cleveland, archts. CD 5/20—ENR 4/8.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldg., facilities, utilities, etc., Sol. 359-43-C139, Galveston Co.

†**Va., Norfolk**—Pub. Housing Auth., NHA, New Monroe Bldg., 2 school bldgs., Va. 44184. B. B. Siegel, Dickson Bldg., archt. CD 5/26—ENR 6/3.



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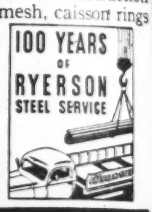

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PUBLIC BLDGS. (Low Bidders, Cont'd.)

LOW BIDDERS

†**Ala., Anniston**—Federal Works Agency, Chandler Bldg., Atlanta, Ga., June 3, hospital, FWA 1-115, Calhoun Co., from Dethlefs-Boozer Co., Anniston. Est. **$366,000.** CD 5/24—ENR 5/27.

†**California**—U. S. Maritime Comn., Financial Center Bldg., Oakland, dormitory bldgs., and recreation bldg., Contra Costa Co., from E. A. Kaiser Co., Richmond War Terrace Post Office, Richmond.

†**California**—U. S. Eng., Wright Bldg., Sacramento, miscellaneous bldgs., Spec. 565, Fresno Co., from T. G. Meyer, 735 Portola Dr., San Francisco, under **$200,000.**

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, 14, Calif., June 8, bldg., facilities, No. 253 C, Riverside Co., from O'Neal & Hedberg, 852 S. Robertson Blvd., Los Angeles, under **$100,000.**

★†**Michigan**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., May 22, temporary family dwelling housing, Ohio 20178, from B. W. Handler Constr. Co. 10 E. 13 St., Chicago, Ill., (a) masonry **$551,000** (b) frame **$524,000.** CD 5/12—ENR 5/6.

†**Pennsylvania**—Pub. Housing Auth., NHA, 270 Bway., New York, N. Y., temporary family dwellings, Pa. 36305, from Trimble Co., 1719 Pennsylvania Ave., N.S., Pittsburgh, base bid 1, plaster. **$495,000** base bid 2, dry wall, **$493,000.** CD 5/7—ENR 4/29.

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., Fort Worth, family dwelling units, Tex. 41573, from Richard A. Brand, 1918 S. Harvey St., Oklahoma City, Okla., **$385,300.** CD 6/2—ENR 6/10.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, June 3, storage facilities, Solic. 359-43-C136, Matagorda Co., from L. Fikes, Texas Bank Bldg., Dallas, **$50,000-$100,000.**

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, June 9, bldgs., sanitary sewerage sys., paving, drainage, gas, water and electric distr. sys., etc., Sol. 359-43-C140, Cameron Co., from H. E. White Construction Co., 1005 S. Broadway, Tyler.

CONTRACTS AWARDED

†**Alabama**—U. S. Eng., Grant St. west of Westwood St., Mobile, bldg. addn., Montgomery Co., to Mac. D. Saxon Co., 210 Coosa St., Montgomery. Est. **$40,000.** Bids 5/29.

†**Arizona**—U. S. Eng., 751 S. Figueroa St., Los Angeles, bldg., No. 211 F, Pima Co., to J. S. Sundt, 440 S. Park Ave., Tucson, under **$100,000.** Awarded 6/8.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., Central California, to Doelger & Strizek, 320 Judah St., San Francisco. Awarded 6/10.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., San Francisco Co., to Lewis Constr. Co., 516 18 St., San Francisco. awarded 6/10.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg., Central California, to J. C. Monk & Son & B. H. Painter, 45 Tait Ave., Los Gatos. Awarded 6/10.

†**California**—U. S. Eng., 751 S. Figueroa St., Los Angeles, 14, Calif., bldgs., San Bernardino Co., to Royal Bldg. Corp., 11201 Long Beach Blvd., Lynwood, under **$40,000.** Awarded 6/8.

†**California**—U. S. Eng., 4792 Sepulveda Blvd., San Bernardino, addnl. constr. imprvs., No. 223c, Kern Co., to Guy E. Hall, 1326 30 St., Bakersfield, over **$50,000.**

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, housing, San Francisco Co., to Lewis Constr. Co., 516-18 St., Oakland. Awarded 6/7.

†**California**—U. S. Eng., 1209-8 St., Sacramento, reroofing bldgs., Spec. 540, Lassen Co., to Sacramento Roofing & Insulation Co., Box 2253, Sacramento, under **$100,000.** CD 5/18—ENR 5/20.

†**California**—U. S. Eng., 74 New Montgomery St., San Francisco, bldg. alterations, addns., San Francisco Co., to Whalin Bros., 2942-23 Ave., Oakland. Awarded 6/7.

†**Colorado**—U. S. Eng., 909-17 St., Denver, temporary frame bldg., Contr. 1728-Eng-317, Denver Co., to N. G. Petry, Denham Bldg., Denver, **$100,000-$500,000.**

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., bldgs., Neg-Jax-43-1007, Hillsborough Co., to R. E. Clarson, Inc., St. Petersburg. CD 6/3—EBR 6/10.

†**Florida**—U. S. Eng., 575 Riverside Ave., Jacksonville 2, Fla., bldgs., and steam distr. Neg-Jax-43-964, Dade Co., to Alexander Orr Jr., Inc., 25 N.E. 20 St., Miami, Fla., under **$500,000.** Awarded 6/8.

†**Georgia**—Firesone Tire & Rubber Co., 1292 Firestone Pkwy., Akron, O., plant alterations, addns., to A. K. Adams Co., 542 Plum St. N.W., Atlanta, over **$100,000.** Defense Plant Corp. will finance.

†**Georgia**—U. S. Eng., Post Office Bldg., Savannah, bldgs., Thomas Co., to Hallman Bros., 1157 W. Peachtree St. N.W., Atlanta. Est. about $325,000.

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

†**Ga., Hinesville**—Federal Works Agency, 18 and F Sts. N.W., Wash., D. C., recreation bldg., to Murphey Pound Constr. Co., Columbus, **$62,830.**

†**Ill., Great Lakes**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., construction, trainer bldg., miscellaneous bldgs., outside mechanical and electrical services, roads and walks, at Naval Training Station, NOY 6261, to W. E. O'Neil Constr. Co., 2751 Clybourn Ave., Chicago, **$278,888.**

†**Kansas**—U. S. Eng., 10 E. 17 St., Kansas City, Mo., temporary frame bldgs., Contr. 461-Eng-11576, Ellis Co., to Johnson-Peterson-Busboom-Rauh, Salina, **$100,000-$500,000.**

†**Kentucky**—U. S. Eng., 612 Federal Bldg., Louisville, storage facilities Contr. 559-Eng-6970, Hardin Co., to J. D. Jennings Co., 235 E. Gaulbert St., Louisville, **$50,000-$100,000.**

†**Michigan**—U. S. Eng., 700 Union Guardian Bldg., Detroit, administration bldg., Chippewa Co., to A. H. Proksch, Iron River, less than **$1,000,000.**

†**Missouri**—Curtiss-Wright Corp., W. C. France, genl. mgr., Robertson, construction, completion engineering bldg., to Mahony-Troast Co., 657 Main Ave., Passaic, N. J. **$260,000.** Defense Plant Corp. will finance.

†**New Jersey**—Bethlehem Steel Co., foot of 14 St., Hoboken, 1 story, 38x118 ft., rein.-con. compressor bldg., to Christie & Leiser, 250 W. 57 St., New York, N. Y., **$40,000.** Federally financed. Lockwood-Greene, 30 Rockefeller Plaza, New York, N. Y., engrs.

†**New Jersey**—U. S. Eng., 6 and Walnut Sts., Phila., Pa., bldg., Monmouth Co., to John Wester & Sons., 320 Amboy Ave., Metuchen. Est. **$50,000.**

†**New Jersey**—U. S. Eng., 120 Wall St., New York, N. Y., bldg., Middlesex Co., to Slonk Constr. Co., 32 Decker Ave., Elizabeth. Est. **$50,000.**

†**New York**—U. S. Eng., 120 Wall St., New York, storage facilities, Contr. 1097-Eng-4063, Suffolk Co., to Auserehl & Son Contracting Corp., 95-40 157 St., Jamaica, under **$50,000.**

†**North Carolina**—U. S. Eng., 308 Customhouse, Wilmington, replacing bldg., Iden. 982-43-220, Cumberland Co., to G. W. Kane, Durham. Est. about **$175,000.** Bids 6/1, awarded 6/4.

★†**Ohio**—Pub. Housing Auth., NHA, 2073 E. 9 st., Cleveland, housing, Project Ohio 33138, frame, plaster wall construction, to W. B. Gibson Co., 200 Chestnut Ave. N.W., Warren, **$517,372.** Bids 5/18, awarded 6/5. CD 5/26—ENR 6/3 under LB.

★†**Ohio**—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., Block B, brick frame bldg., Cuyahoga Co., to Carl E. Erickson & Co., Inc., 4753 N. Bway., Chicago, Ill., **$1,439,500.** Bids 6/2. CD 6/10, under LB—ENR 6/10.

†**Ohio**—U. S. Eng., 925 New Federal Bldg., Pittsburgh, Pa., temporary frame bldgs., Contr. 1101-Eng-6411, Cuyahoga Co., to Welso Constr. Co., 2233 W. Grand St., Chicago, Ill., **$100,000-$500,000.**

†**Oklahoma**—U. S. Eng., 416 Wright Bldg., Tulsa, temporary frame bldg. addns., Contr. 957-Eng-1883, Oklahoma Co., to Ditmars-Dickmann Constr. Co., Muskogee, **$100,000-$500,000.**

†**Pennsylvania** — Fleetwings Mfg. Plant, Bristol, plant addn., to Wintz Bros., 1618 Sellers St., Phila., over **$150,000.** Federally financed.

†**Pennsylvania**—U. S. Eng., Standard Oil Bldg., Baltimore, Md., temporary frame bldgs., Contr. 174-eng-3004, Monroe Co. to Ritter Brothers, 1511 N. Cameron St., Harrisburg, **$100,000-$500,000.**

†**Pa., Phila.**—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., exten. to Factory Bldg. 600, NOY 6044, to Hughes-Foulkrod Co., 809 Schaff Bldg., **$87,700.**

†**South Carolina**—U. S. Eng., 33 Customhouse, Charlotte, addnl. bldgs., Florence Co., to Boyle Constr. Co., Sumter. Bids 6/7.

†**Texas**—U. S. Eng., Albuquerque, N. M., addnl. storage facilities, Ward Co., to De Luca & Son, 1745 Filbert Ave., San Francisco, Calif., under **$50,000.**

†**Texas**—U. S. Eng., 231 W. Main St., Denison, addnl. plant construction, Tarrant Co., to Rob. E. McKee, 1918 Texas St., El Paso, **$100,000-$500,000.**

†**Texas**—Pub. Housing Auth., NHA, 1205 Electric Bldg., 7 and Taylor Sts., Fort Worth, apartment bldgs., to Southgate Constr. Co., c/o A. J. Sheffield, 1811 Southgate St., Houston, approx. **$150,000.** L. P. McKenzie, 4425 Roseneath St., Houston, archt.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., Solic. 359-43-C127, Cameron Co., to M. R. Nelson, McAllen, under **$50,000.** Bids 5/31.

†**Texas**—U. S. Eng., 25 St. and Avenue F, Galveston, bldgs., housing conversion, Solic. 359-43-C124, Harris Co., to T. D. Howe

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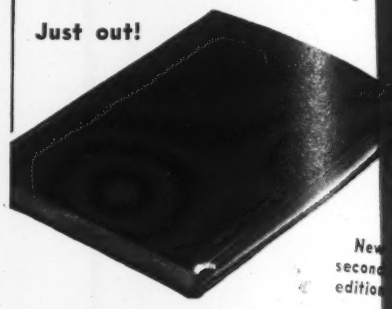

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PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

Constr. Co., 3210 White Oak St., Houston, $100,000-$100,000.

†Texas—U. S. Eng., 231 W. Main St., Denison, bldgs., Cooke Co., to J. W. Bateson Co., Allen Bldg., Dallas, $500,000-$1,000,000. CD 5/29, awarded 6/8.

†Texas—U. S. Eng., Fort Sam Houston, hosp. bldgs. in storage area, Bexar Co., to H. Raybourn, 326 Funston Ave., San Antonio, under $50,000.

†Va., Alexandria — Pub Housing Auth., NHA, Temporary Bldg. 2, 19 and D Sts. N.W., Wash., D. C., 50 trailer housing, Projects 44282 and Va. 44289, to N. L. Brody, 621 Connecticut Ave., Wash., D. C., $400,908. CD 6/3.

†Va., Norfolk—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., construction at Naval Supply Depot, NOY 6522, to Wise Contr. Co., 122 N. Knight St., Richmond, and Virginia Engineering Co., Inc., 330-28 St., Newport News, $310,000. CD 6/7.

†Va., St. Helena—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 2 warehouses, St. Helena Repair Base, NOY 6481, to Rust Engineering Co., Clark Bldg., Pittsburgh, Pa., $104,800.

†Va., Williamsburg—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., 48 unit housing at Naval Supply Depot, at Cheetham, near here, NOY 6112, to Virginia Engineering Co., Inc., 330 28 St., Newport News, $184,030.

†Wisconsin—A. O. Smith Corp., 3533 W. 27 St., Milwaukee, structural steel for propeller blade factory, to Wisconsin Bridge & Iron Co., 5023 N. 35 St., Milwaukee (9), Wis. Defense Plant Corp will finance. CD 6/7—ENR 6/10.

★B. C., Vancouver—Wartime Housing, Ltd., 55 York St., Toronto, Ont., 300 houses and roads, sewers, ditches, Sea Island, near here, to Smith Bros. & Wilson, Ltd., 1267 Richards St., about $800,000. McCarter & Nairne, 1930 Marine Bldg., archts. CD 5/11

Ont., London—Secy. Dpt. P. Wks., Ottawa, occupational colony (Units 1 and 2), at Military Hospital, to Redfern Const Co., Ltd., 30 Bloor St. W., Toronto, about $283,000. CD 5/20—ENR 5/27.

Ont., Ottawa — Dpt. National Defense (Army), temporary military huts for Home Guard Unit, Varsity Oval, to Alex. I. Garrock, Regent Theatre Bldg., Sparks St., $157,000.

COMMERCIAL BUILDINGS

PROPOSED WORK

Conn., Bridgeport — Roosevelt Apts., Inc., c/o M. Friedman, agt., 211 State St., plans completed by J. Gerald Phelan, 211 State St., 76 garden type, brick apartments, William St. Over $150,000. Fletcher Thompson, Inc., 211 State St., engr.

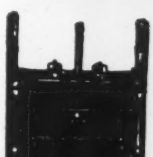
Mass., Ware—Mary Lane Hospital, South St., plans by Kendall, Taylor & Co., 221 Columbus Ave., Boston, 3 story, 45 x 100 ft. brick, steel maternity hospital unit and boiler plant, $150,000.

Miss., Jackson—Bd. Trustees, Institutions of Higher Learning, soon lets contract, social science and health bldg. $100,000. N. W. Overstreet, 201 N. Lamar St., archt.

N. J., Orange—Corporation forming, c/o Jas. Dorment, 180 Union St., Montclair, fifty 2 story, bsmnt., brick, concrete block residences, Hickory and Reynolds Sts. $200,000.

O., Akron—St. Thomas Hospital, Sister Eleanor, in charge, 414 N. Main St., plans nearing completion by Kraus & Helmcamp, 1st Central Tower Bldg., 1 story, bsmnt., 42x200 ft., brick, rein.-con. hospital addn. $225,000. Arthur E. Rowe, 1900 Euclid Ave., Cleveland, structural engr.

RODNEY HUNT



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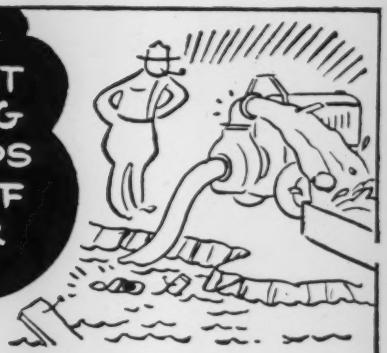
CONTRACTOR SMITH KNEW THAT HIS SELF-PRIMING CENTRIFUGAL PUMPS WOULD GET RID OF A SKAD OF WATER IN A HURRY

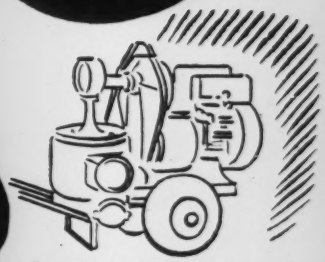


He also knew that a self-priming pump can handle more water for its size than any other pump on a dewatering job. Then again he had seen self-primers do well point work, seepage and handle sand and silt too.

In the smaller sizes of self-primers, difficulty has been experienced by contractors with all makes of pumps on these jobs. Impellers and pump cases have been chewed out long before their time. Seals fail and they take too long to prime.

—BUT HE DIDN'T KNOW THAT HE WOULD SOON WEAR THEM OUT TRYING TO PUMP A HIGH PERCENTAGE OF MUD AND SAND

FOR THESE JOBS HE SHOULD HAVE USED DIAPHRAGM PUMPS DESIGNED WITH NO CLOSE CLEARANCES BETWEEN WATER MOVING PARTS



For jobs for 6000 G.P.H. or less on which mud, sand, and trash are to be encountered, use the diaphragm pump. Seepage is another diaphragm pump job.

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Above is shown an assembly bay of a tank manufacturer; at the top a tank on the testing ground. This typifies the kind of heavy duty service encountered.

A TANK TESTED FLOOR TOPPING

At a tank plant the heavy steel-tread tanks return from the testing ground and claw their way up an inclined ramp. Here they are washed, then slither back down this ramp—which gives double duty and gets double wear.

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EMERY
Aggregate
for heavy duty non-slip floor topping

COMMERCIAL BLDGS. (Proposed) Work, Co
O., Cleveland—Fairview Park Hospital, Vollmer, Jr., supt., 3305 Franklin Blvd., pla by Geo. S. Rider Co., engr. and archt., Terminal Tower, 2 story, brick, concrete hospital addn. $250,000.
Ore., Astoria—Astoria Homes Inc., J. Todd, pres., Astoria, bids this month 24 private homes development, Olney Ave. $120,000. FHA.
Pa., New Brighton—New Home Assn., J. Martsolf, pres. and archt., 512 3rd Ave., will start plans upon completion of formation of corporation, thirty-two 1½ and 2 story bsmnt., brick, frame residences. $160,000.
Pa., Phila.—Frank Kiely, 611 Arbutus St., 2 story, brick housing, Barringer St. between Stenton Ave. and Crittenden St.
Pa., Sewickley—Steelwood Corp., A. Miller, pres., 508 Grant St., Pittsburgh, for 2 story, bsmnt., 25x42 ft., brick, fire residences, Ohio River Blvd. $160,000.
Tex., Houston—Denver Housing Corp., C. Malone, pres., Kirby Bldg., 50 or more frame dwellings, rein.-con. fdns. $175,000. FHA.
Vt., Stratford—Vermont Copper Co., Inc., G. A. Ellis, 120 Bway., New York, N. Y., story family dwelling units, $150,000.
Ont., Grimsby—West Lincoln Memorial Hospital Bd., c/o Dr. Theodore Rogers, new hospital.
Ont., Ottawa—R. C. Episcopal Corp., St. Patrick St., plans by A. Martineau, 37 Picadilly Ave., seminary. $200,000.
★ **Ont., Sarnia**—Reverend Sisters of St. Joseph, London, plans by O. R. Moore, 26 Dundas St., London, 6 story, 70x220 ft., brick hospital, Russel St. and London Rd. $500,000. CD 5/18—ENR 5/20.
Que., Montreal—Governors of McGill University, Sherbrooke St. W., new bldg. known as Divinity Hall. $150,000.

LOW BIDDERS

S. C., Charleston—Washington Realty Co., 88 Broad St., converting old 3 and 4 story bagging mill into 82 dwelling units, Project W28-A-52, John and Meeting Sts., from Skinner & Ruddock, 155 E Bay St., $253,77 A. Constantine, 149 Calhoun St., archt.

CONTRACTS AWARDED

Calif., Richmond—Atchison, Topeka & Santa Fe Ry. Co., M. C. Blanchard, ch. engr. (Coast Lines) Kerchoff Bldg., Los Angeles, dormitory (50 rooms, restaurant and recreation room) to Barrett & Hilp, 918 Harrison St., San Francisco. CD 3/30—ENR 4/8.
Calif., Riverside—Marshall Tilden, 3912½ 14 St., 24 permanent wood frame duplex dwellings on Everset St., Arlington, Magnolia and Central Aves. Owner builds. $160,000.
Calif., San Francisco—Tru-Value Constr. Co., Inc., 26 Ocean Ave., frame residence. Owner builds. Over $150,000.
Conn., Bristol—Sylbern Homes of Connecti

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MMERCIAL BLDGS. (Contracts Awarded, Cont'd.)

, Inc., Brookville Blvd., Valley Stream, I. N. Y., sixty-one 23x30 ft., fourteen 24x29 and twenty-three 23x28 ft. frame houses, crete fdns. Owner builds. **$489,200.**

Conn., East Hartford (br. Hartford)—Hock-man Homes, Inc., P. O. Box 135, thirty 1½ story, 25x32 ft. houses, Salem Rd. Owner builds. **$153,000.** Jos. E. Kane, 49 Pearl St., Hartford, archt.

Conn., Hartford—Branford Homes, Inc., c/e J. E. Kane, archt., 49 Pearl St., 57 duplex houses, Branford and Woodstock Sts. Owner builds. **$342,000.**

Conn., Hartford—Branford Homes, Inc., 49 Pearl St., forty 1½ story, frame houses, con-crete blk. fdns., Branford St. Owner builds, $300,000. J. E. Kane, 49 Pearl St., archt.

★**Conn., Manchester** — Manchester Homes Corp., D. Rose, 758 Brady Ave., New York, N. Y., ten 100 unit apartments, Olcott prop-erty, Main St. Owner builds. **$750,000.**

Conn., Manchester—I. Stich, 57 Arvine Pl., seventy 1 family houses, Middle Turnpike. Owner builds. **$420,000.** CD 5/24—ENR 5/27.

Conn., Manchester—Homes, Inc., Jos Slobin, 31 Westbourne Pkway., Hartford, 35 houses, Coolidge, Hyde and West Center Sts. Owner builds, **$157,500.** David S. Douglas, 209 Sedg-wick Rd., West Hartford, archt.

La., New Orleans—Belque Corp., c/o Gen-eral Contractor, 40 dwellings on Mandeville, Spain, Vienna and Madrid Sts., to J. O. Raebel, 4217 Rocheblave St. Est. **$160,000.**

Miss., Pascagoula—Inglewood Homes, Inc., c/o Chas. B. Taylor, pres., 116 dwelling units, Lincoln and Pascagoula Aves., to W. C. Whelan, Huntsville, Ala., and J. E. Crain, 1960 Westmoreland Dr., Nashville, Tenn., about **$348,000.** FHA.

O., Cleveland—Superior-Coventry Co., M. J. Proud, 3653 Cheton Rd., Cleveland Heights, 3 story, bsmnt., 58x165 ft. apartment, to M. Applebaum, 3284 Enderby Rd., Cleveland Heights. Est. **$150,000.** M. P. Halperin, 3759 E. 146 St., Cleveland, archt.

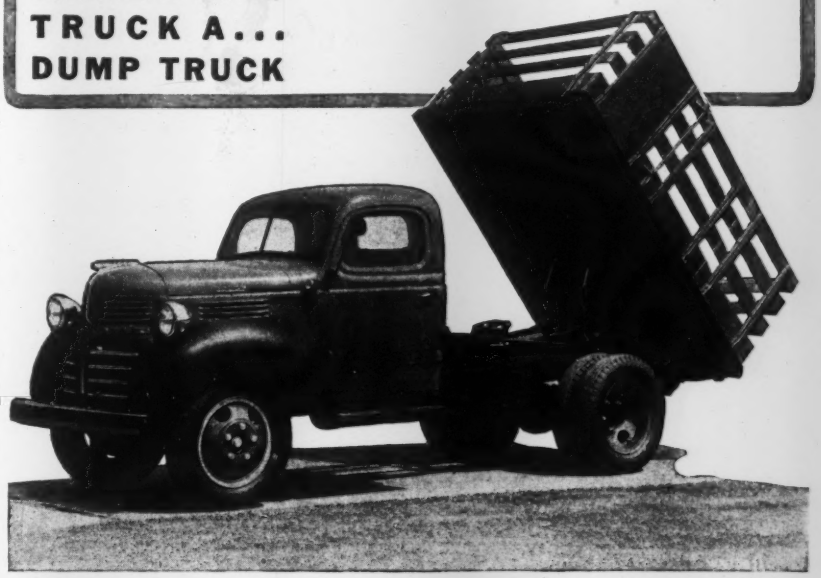
O., East Cleveland—Lakeview Building Co., 2214 Lakefront Ave., Cleveland, 3 story, bsmnt. 58x217 ft. apartment, to M. Apple-baum, 3824 Enderby Rd., Cleveland Heights. Est. **$175,000.** CD 6/3—ENR 6/10.

★**Tex., Ft. Worth**—Parkview, Inc., c/o con-tractor, four 16 apt., eight 12 apt. and seven 8 apt. bldgs., brick veneer, 3100 blk. Camp Bowie Blvd., to L. F. Corrigan, South-land Life Bldg., Dallas, **$887,000.** W. W. Ahl-schlager, Southland Life Bldg., Dallas, archt.

Wash., Everett—James H. March Constr. Co., 780 Commerce St., Tacoma, 103 frame housing units, 16 and Walnut Sts., day labor. **$360,000.**

A HERCULES HYDRAULIC BOOSTER HOIST

MAKES ANY TRUCK A... DUMP TRUCK



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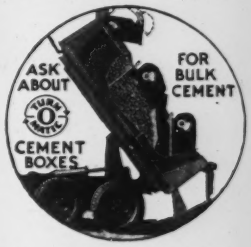
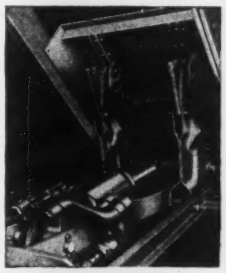
With wartime restrictions preventing your purchase of all the new equipment you need, it's more important than ever that present equipment be used at maximum efficiency.





Model KXE Hercules Booster Hoist, with 6" cylinder, for bodies up to 12 feet long. Rated capacity of 4 tons with a 9 foot body. Control valve is operated from the driver's seat, and the low oil pressure required assures long life of unit.

Reinforcing plate relieves lifting strains. Assembly includes 12 foot steel sills for reinforcement of wood body sills.

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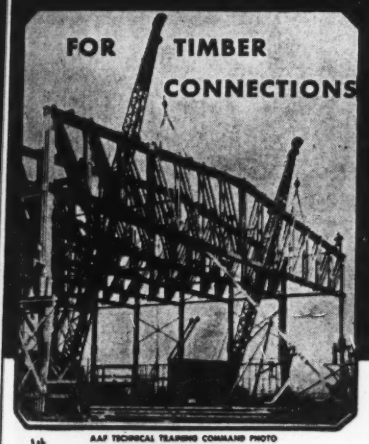

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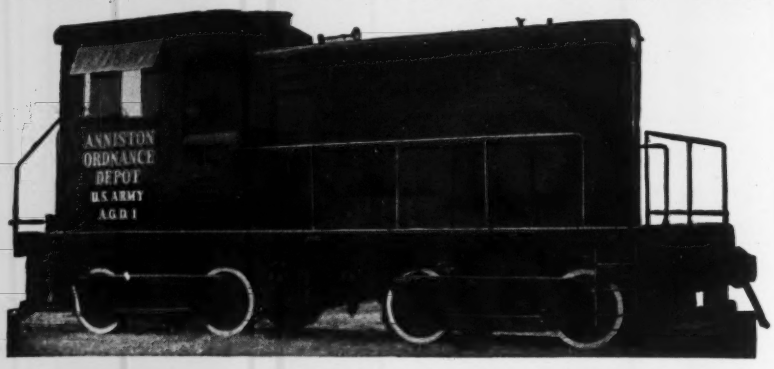

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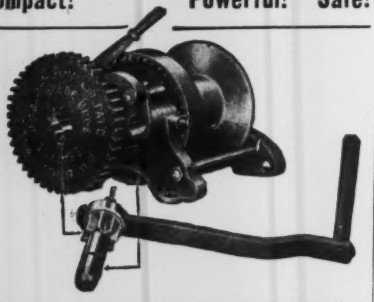

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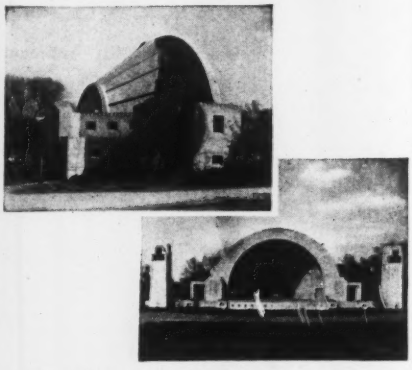

The photos above show the Municipal Band Shell at Milwaukee, Wisc., the shell, or roof, of which is reinforced "GUNITE" over structural steel.

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ALLENTOWN, PENNSYLVANIA

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INDUSTRIAL BUILDINGS

PROPOSED WORK

California — PLANT — Lockheed Aircraft Corp., Burbank, plans completed by Parkinson & Parkinson, Title Insurance Bldg., Los Angeles, 4 story, 56x259 ft., reinforced concrete bldg. addn. Over $40,000.

Conn., Derby—PLANT—Marvelous Dyeing & Finishing Co., Chas. Carlo, [illegible] Roosevelt Dr., sketches reconstructing dyeing and finishing plant, Roosevelt Dr. $40,000.

Ia., Middle Amena—PLANT—Amana Society Refrigeration Mfg. Co., rebuilding meat plant.

La., Whitecastle—FROZEN FOOD LOCKER—E. J. Hebert, Whitecastle, frozen food locker.

Md., Fairfield (sta. Baltimore)—POWER PLANT—Bethlehem-Fairfield Shipyards, Inc., 1101 Key Hy., Baltimore, soon lets contract for power plant alterations, addnl. electrical facilities.

Mich., Detroit—WAREHOUSE—Owner, Geo. F. Diehl, archt., 120 Madison Ave., preparing plans 1 story, 100x200 ft., concrete steel, brick warehouse, plain fdn. $50,000.

Mich., Lansing—FACTORY—Lansing Paint & Color Co., Glenrose, soon lets contract for 1 story, concrete block, frame factory bldg., $200,000. Black & Black, 706 Capital Savings & Loan Bldg., Lansing, archts.

Minn., Fergus Falls—PLANT—Fergus Falls Co-op. Creamery Assn., Fergus Falls, plans by Klinger, Hubbard & Gohn, engrs. and archts., 218 S. Barstow St., Eau Claire, Wis., 1 and 2 story milk dehydrating plant, brick, tile, concrete fdn. CD 5/26—ENR 6/3.

Minn., Parkers Prairie—BOILER ROOM—Parkers Prairie Co-op. Cream Assn., Parkers Prairie, plans by Klinger, Hubbard & Gohn, engrs. and archts., 218 S. Barstow St., Eau Claire, Wis., 2 story, 29x45 ft. boiler room, 1 story, 16x57 ft. receiving room, brick, tile, concrete fdns.

Miss., Cleveland—FROZEN FOOD LOCKER—H. Ling, Cleveland, frozen food locker.

Miss., Greenville—FROZEN FOOD LOCKER—N. Rogers, Greenville, frozen food locker.

Mo., St. Louis—PLANT—Blanton Co., 30 North Wharf St., St. Louis (7), bids soon superstructure for 1 story, 77x103 ft. soybean processing plant bldg., brick, concrete. Excavation and fdns. to Alport Constr. Co., Ambassador Bldg., 7 and Locust Sts., St. Louis 1. Gray & Pauley, 3800 West Pine St., St. Louis 8, archts. CD 6/1—ENR 6/10.

O., Cleveland—FACTORY—The Champion Machine & Forging Co., 3695 E. 78 St., plans completed by McGeorge & Hargett, 94 Quincy Ave., 2 story, bsmnt., 80x200 ft., brick, rein.-con. factory. $150,000.

O., Cleveland—BOILER PLANT—American Magnesium Corp., subsidiary of Aluminum Co. of America, A. R. Crow, supt. constr., 22 Harvard Ave., soon lets contract, 1 story, bsmnt., 45x100 ft., brick, concrete boiler house, 45x50 ft., coal storage shed and retaining walls, etc. Snyder & McLean, 2214 Penobscot Bldg., Detroit, Mich., engrs. CD 5/26—ENR 6/10.

O., Tiffin — FACTORY — Cleveland Quarries Co., Guildhall Bldg., Cleveland, made plans 2 factory addns. of Sterling Grinding Div., Cleveland Quarries Co. plant, 1 bldg. will be 70 x 295 ft., housing 170 ft. tunnel kiln, $100,000 or more.

Tenn., Forrest Hill — FROZEN FOOD LOCKER—J. King, Forrest Hill, frozen food locker.

Tenn., Sharon—FROZEN FOOD LOCKER—M. D. Brooks, Sharon, frozen food locker.

Tex., Ft. Worth—FACTORY—Hyde Co., 10 N.W., 4 St., 1 story, 100x200 ft., brick factory addn. $40,000.

Wis., North Lake—PLANT—Inedible Rendering Co., c/o J. Topzant, archt., 424 E. Wells St., Milwaukee, 2 story, 40x80 ft. rendering plant, rein.-con.

Wis., Marshfield—FACTORY—Roddis Lumber & Veneer Co., 115 S. Palmetto St., 1 story, bsmnt., 24x24 ft., brick factory addn., concrete fdn. Helmick, Edeskuty & Lutz, 41 Essex Bldg., Minneapolis, Minn., engrs.

Wis., Watertown—MILK PLANT—Dairy Co-operative Assn., Juneau. Grade A milk plant.

Alta., Exshaw — PLANT — Canada Cement Co., Ltd., Phillips Square, Montreal, Que., plant addn.

Alta., Turner Valley—PLANT—Royalite Oil Co., Ltd., 606 Second St., Calgary, plant addn., $300,000.

B. C., Dawson Creek—PLANT—C. E. Shaver, Dawson Creek, hollow tile, stucco plant, $53,200.

B. C., Kamloops—PLANT—Skelly Canning Co., Ltd., 475 Victoria St. W., canning plant.

B. C., Vancouver—PLANT—Western Plastics, Ltd., 506 Rogers Bldg., treating and fabric preserving plant, and woodworking plant.

B. C., Vancouver—PLANT—False Creek Industries, Ltd., 614 W. Pender St., plant for

DUSTRIAL BLDGS. (Proposed Work, Con.)

B. C., Vancouver — SAW MILL, etc — ...itt-Naugle, Ltd., 640 W. Pender St., saw ... and allied plant construction $50,000.

B. C., Vancouver—LOGGING PLANT—W. S. ...ble Timber Co. Ltd., 419 Pacific Bldg., log-... plant, saw mill, etc. $50,000.

B. C., Vancouver—PLANT—National Bis-... Ltd., L. H Nicholson, mgr., 1706 W. 1 ... plant addn. $50,000.

N. S., Fairview (Postal District, Halifax)—...RAGE, etc.—Irving Oil Co., Ltd., garage ... auto repair shop. $40,000.

N. S., Sherburne—PLANT—Canadian Fair-...ks Morse Co. Ltd., 980 St Antoine St., ...ontreal, Que., plant exten $77,133.

Ont., Almonte—PLANT—Lanark Farmers-...-Operative, Ltd., c/o H. L. McGill, 510 Castle ...g., Montreal, refrigeration plant addn., ...ill St. $40,000

Ont., Riverside—PLANT—Commercial Press ..., Ltd., c/o Walter Crass Weller, River-...de, general lithographing, letter press print-...g and binding plant. $40,000

Ont., Sault Ste. Marie—PLANT—Lake Su-...erior Copper, c/o William S. Maguire, barris-...r, Sault Ste Marie, development operations, ...ining and milling plant. $50,000

Ont., Timmins—FOUNDRY, etc.—Harnden ...elding Works, Ltd., c/o F. H Bailey, atty.-...-law, foundry and welding shop, etc. ...0,000

Ont., Toronto — MANUFACTURING — Ken-...ood Auto Body, Ltd., c/o Arthur L. Smoke, ...orthern Ontario Bldg., mfg plant.

Ont., Toronto—MINING—Big East Mica ...ines, Ltd., c/o R A. Biggs-K. C., 171 Rot-...urgh St., mining development, raising, crush-...g and washing plant. $50,000.

Ont., Toronto—FOUNDRY—Universal Engi-...eering, Ltd., c/o J. Lizewaki, Oshawa, iron ...d brass foundry $40,000.

Ont., Toronto—PLANT—L. Fisher Co., 33 ...lameda Ave., metal spinning plant, $40,000.

Ont., Toronto—PLANT—Reynold-Coventry, ...td., 1006 Mount St., Montreal, Que., plant, ...dward St. $50,000.

Que., Montreal—PLANT—Associated Screen ...News Ltd., 2000 Northcliffe Ave., reconstruct-...g plant and addn. to printing department. ...0,000

Que., Montreal—GARAGE, etc.—Montreal ...ramways Co., 159 Craig St. W., bus garage ...d shops, Atwater Ave. and Centre St. ...5,000

Que., Montreal — PLANT — Sweeney Barrel ...o., Ltd., 5433 Casgrain St., purchased 13,000 ...q. ft. site for barrel plant addn.

Que., St. Louis de Gonzague—FACTORY—...louthier & Laberge, 2 story, 130 x 145 ft. ...ax factory. $40,000

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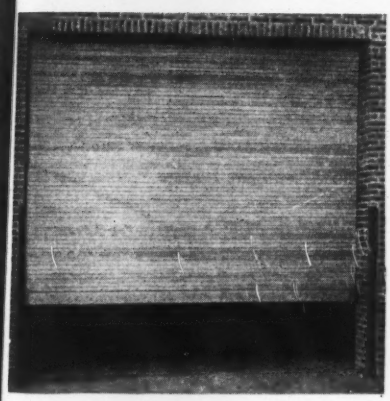

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Smooth, easy operation . . . an interlapping-slat curtain that coils out of the way, safe from damage . . . maximum savings in floor, wall and ceiling space . . . full weather protection . . . choice of motor or manual control! Kinnear WOOD Rolling Doors duplicate *all* these advantages of the Kinnear Steel Rolling Door, *with maximum savings in war-vital steel!* Any size. Write for bulletin 37! The Kinnear Mfg. Co., 1820-40 Fields Ave., Columbus, Ohio.

SAVING WAYS IN DOORWAYS **KINNEAR** ROLLING DOORS

● In the building program of the rapidly expanding aircraft industry, Dravo Direct Fired Heaters are receiving substantial recognition. It is fitting that so modern a heating method should figure in the growth of this era's most significant industry.

For Dravo Direct Fired Heaters are as modern as flying! Compact and self-contained, they efficiently convert fuel into heat and quickly distribute it in the area where needed. The Dravo Direct Fired Heating system excels the usual steam heating system:—its light weight saves large quantities of scarce metals, its factory construction minimizes the man hours needed for actual installation, its high heat transfer efficiency reduces fuel requirements as much as twenty to twenty-five per cent!

Let us send you a general catalog (505) describing the range of sizes and types, as well as a special bulletin (506) setting forth the savings in critical materials that the modern heating system brings to industry.

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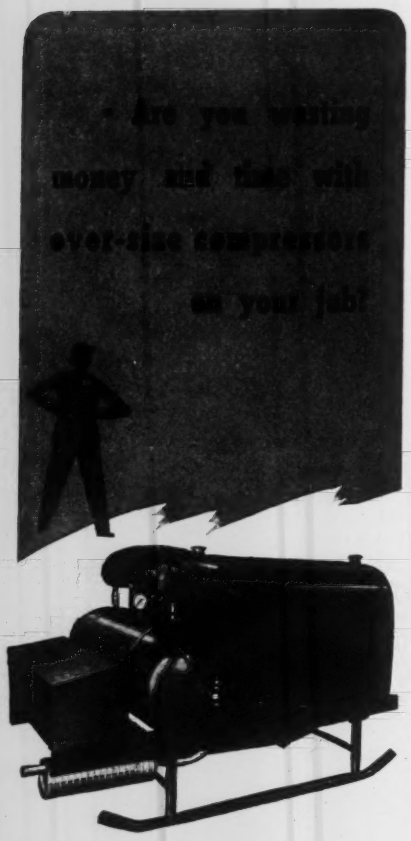

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Use only 1 gal. of gasoline an hr.

Here's your compressor for a majority of work. It's big enough—powerful enough to "take it" year after year. Yet, it's easy to move from one job to another and inexpensive to operate. Made with FORD MOTORS and standard parts. Automatic unloading and idling; self-starter. Won't you write for complete information?

With a Ford Motor and Shop facilities you can assemble your own Smith Compressor. We will furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

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SMITH

INDUSTRIAL BLDGS. (Proposed Work, Con.)

Que., Valleyfield—STORAGE, etc.—Canadian Bronze Powder Works, Ltd., 9 East Park, bids soon reconstructing three 23x27 ft. powder storage bldgs., 1 filling and shipping bldg. and 1 sifter bldg. $57,680. CD 5/11.

BIDS ASKED

O., Tiffin—TUNNEL KILN, etc.—Sterling Grinding Co., A. R. Green, vice-pres., 45 W. Prospect Ave., Cleveland, 1 story, 70x298 ft. tunnel kiln, 1 story, 70x72 ft. factory. $60,000. H. Kuhn, 69 Sycamore St., engr.

Pa., Pittsburgh — WAREHOUSE — Seaboard Glass & Bottle Co., R. R. Underwood, pres., 26 St. and A. V. R. R., 1 story, 50x200 ft., brick warehouse. CD 4/13—ENR 4/15.

B. C., New Westminster—PLANT— Fraser Valley Fibre Flax Growers Assn., New Westminster, D. E. MacKenzie, secy., 7 Campbell River Rd., flax processing plant, incl. office, scale house and finishing room, deseeding shed, etc. $100,000.

Ont., White River—CAR BARN—Canadian Pacific Ry. Co., T. B. Ballantyne, dist. engr. (Ontario Dist.), Union Station, Toronto, 47 x 180 ft., brick, steel, railway car barn. About $45,000.

CONTRACTS AWARDED

Ala., Gadsden—FACTORY—Goodyear Tire & Rubber Co., Gadsden, factory addn., to Rust Eng. Co., Martin Bldg., Birmingham. Est. **$100,000.** F. B. White, Gadsden, plant engr.

Alta., Edmonton—PLANT—Aircraft Repair Ltd., Edmonton, plant exten., to H. G. MacDonald, 612 Tegler Bldg. Est. **$40,000.**

Calif., Berkeley—MACHINE SHOP—Columbia Machine Wks., 7 and Carleton Sts., machine shop addn., to Alfred J. Hopper, 243 Langton St., San Francisco. CD 5/26.

Calif., Sunnyvale—VOCATIONAL TRAINING—Joshua Henry Iron Works, Hendy Ave., 2 story vocational training bldg., to MacDonald & Kahn, Inc., 200 Financial Center Bldg., San Francisco.

Ia., Newton—FACTORY—The Maytag Co., Newton, factory, to Arthur H. Newmann & Bros., Inc., Hubbell Bldg., Des Moines. Est. **$150,000.** CD 4/14—ENR 4/22.

Md., Baltimore—SHOP, etc.—Chas. J. Brandt, Inc., Bush and Ridgely Sts., 1 story, 65x200 ft., brick, steel, concrete shop addn., and 2 story, 45x72 ft. office addn., to George S. Awalt, 418 Morris Bldg. Est. **$60,000.** L. R. White, Jr., 10 W. Chase St., archt.

Mass., East Boston — SHOP, etc. — Mystic Steamship Div. Eastern Gas & Fuel Corp., F. B. Craven, mgr., Lewis Wharf, Boston, machine shop, carpenter shop, fabricating units, Border St., to F. Leroy Fox, Inc., 101 Milk St., Boston. Est. **$155,000.** Bids 6/3. CD 5/28.

Mo., St. Louis — MACHINE SHOP — John Ramming Machine Co., 4591 McRee Ave., St. Louis 10, Mo., 1 story, 23 x 181 ft., brick, rein.-con. machine shop addn., concrete fdn., to F. Koenig, 3918 Bowen St., St. Louis 16, Est. **$40,000,** incl. equip.

Mo., St. Louis — WAREHOUSE — Laclede-Christy Clay Products Co., 1711 Ambassador Bldg., 411 N. 7 St., St. Louis 1, Mo., 2 story, 44 x 130 ft., brick, steel warehouse, rein.-con. fdn., 4714 S. Kings Highway. Owner builds. **$40,000** incl. equip. E. H. Krautheim, 5900 Manchester Ave., St. Louis 10, archt.

N. J., Jersey City—PLANT—Standard Heater & Oil Equipment Co., 245 Cornelison Ave., 1 story, 60x140 ft. assembly bldg., also 2 story, 40x100 ft. utility bldg., both rein.-con., steel, day labor, **$75,000.** CD 3/30—ENR 4/1.

R. I., East Greenwich—PLANT—Community Food Center, Inc., H. W. Hathaway, genl. mgr., Vaughn St., Greenwood, frozen food compartment plant, Queen and Marlboro Sts. Owner builds. **$40,000.**

Tex., Dallas—FACTORY—National Geophysical Co., 8806 Lemmon Ave., 2 story, 100x200 ft. hollow tile type factory bldg., to Cowdin Bros., 411 S. Haskell St., about **$50,000.** CD 6/3—ENR 6/10.

Tex., Fort Worth—PLANT—Kent Mfg. Co., 2401 Montgomery St., 1 story, steel, sheet metal, etc. clothing mfg. plant addn., to Butcher & Sweeney, 806½ Taylor St., **$43,600.**

Wis., Kenosha—STORAGE—Snap-On Tools Corp., 8028 28 Ave., design and construction 1 story, 40x130 ft. brick, storage bldg., concrete fdn., to Austin Co., 510 N. Dearborn St., Chicago, Ill. Electrical work by owner.

Wis., Marshfield — PLANT — Clover Cream Dairy Product Co., 213 E. Depot St., 2 story, 40x100 ft., 1 story, 38x47 ft. and 1 story, 22x40 ft. milk dehydrating plant addns., alterations, brick concrete fdn., to Frank Felhofer, 700 E. 4 St. CD 5/4—ENR 5/6.

Wis., Wausau—FACTORY—Wausau Motor Parts Co., 1007 Harrison Blvd., 1 story, 70x200 ft. frame factory addn., concrete block fdn., to Paul Wergin, 123 Grand Ave.

N. S., Halifax—STORAGE, etc.—Foundation, Maritime, Ltd., 135 Lower Water St., 1 story, 41x172 ft., rein.-con. storage bldg. and carpenter shop, Lower Water St., rein.-con. fdns. Owner builds. **$168,000.**

For Proposal Advertisements see p. 175
For Postwar Projects see p. 142

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